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CONTENTS.

Pig Iron Output, 27,250,000 Tons

Last Year's Record Far Beyond That of 1909

Many More Furnaces Blown Out—Little Buying of Finished Material

Pig iron output was sharply cut down in December, and on January 1 the number of furnaces in blast, 188, was 27 less than at the beginning of December. The December production of coke and anthracite pig iron was 1,774,817 tons, or an average of 57,252 tons a day, as against 63,659 tons a day in November. The December output was thus only slightly above that of December, 1908, an indication that the restriction of output may be approaching if it has not already crossed the line representing ordinary wear and tear consumption.

Steel works blast furnaces were responsible for almost all the reduction of 6400 tons from the daily rate of pig iron production in the previous month, the output of merchant furnaces in December being only 900 tons a day less than in November. The country is now producing pig iron at a yearly rate of about 19,700,000 tons, as against a rate of 31,600,000 tons in February of last year. The total pig iron production in 1910 was in excess of 27,250,000 tons, or more than 1,450,000 tons beyond the best previous record—namely, 25,795,000 tons in 1909.

Developments of the week in finished material have been meagre, but sentiment is rather more hopeful, the disposition being to look forward to the outcome of present forbidding conditions, having in mind the well-known tendency of the iron trade to overdo its depressions as well as its booms. There is little expectation of a large movement in the first quarter of the year, and manufacturers adhere to the view that price reductions now would not meet such a response as came in the spring of 1909. Much is made in the lake ore market of the fact that furnaces with large supplies of ore on hand do not favor a reduction in the price for 1911. Similarly at Chicago the implement manufacturers are reported to favor the maintenance of present prices on bars, even though a reduction would carry a revision on their contracts. They fear the effect on the market for their own product.

Pittsburgh reports inquiry for Bessemer, basic and foundry irons, including one lot of 5000 tons and another of 2500 tons of Bessemer for the first half. At Chicago the price of No. 2 Northern iron, nominally $16 for some time, is now generally $15.50. Some sales of Southern foundry iron have been made at $11, Birmingham, and this has been shaded on Tennessee iron for early delivery.

The general tendency to weakness in all pig iron markets has found no check as yet in the cutting down of output. A number of large buyers are waiting for signs of low point, but such buyers recall that their pur-

chases one year ago were made too soon and are accordingly cautious.

At Chicago rather better inquiry is reported from railroads, and at Pittsburgh car inquiries are coming up more encouragingly, including 3500 for the Buffalo, Rochester & Pittsburgh, 3000 for the Pennsylvania, 3000 for the Kanawha and 2000 each for the Wabash Pittsburgh Terminal and the Pittsburgh, Shawmut & Northern.

Billet prices have been shaded at Pittsburgh. At Chicago forging billets, in which there has been close competition for some time, as low as $25 being reported some weeks ago, are now held at $31.

Buyers of finished material appear to attach a market significance to the meetings of manufacturers in New York next week, but these are not expected to result in immediate price changes.

The outlook for structural steel is a good feature of the situation. In New York City the Pennsylvania Terminal post-office work, 6200 tons, was taken by the George A. Fuller Company, and the Sloane warehouse, 2500 tons, by Levering & Garrigues. The New York Central has asked bids on 5400 tons of bridge and pier work.

The competition of iron bars is still cutting in on the business of the steel bar mills. Some fair orders have been placed for hard steel bars for concrete work.

Pig tin is still soaring, and this week has reached 39.55 cents, under considerable buying for consumption. The advance in this metal in the past year has been 6.40 cents, whereas copper, spelter and the other metals have all declined 1 cent or more since early 1910.

The Outlook

Seldom has the iron trade entered upon a year more beset with uncertainties than is 1911. It was said in these columns one year ago that of no year had larger expectations been entertained at its beginning than iron and steel manufacturers had of 1910. Moreover, in spite of disappointment and reaction, these expectations were, in some measure, realized, for 1910 was a year of record production of pig iron and steel ingots. Presumably there was a record domestic consumption also, though it is to be considered that some of the product was stocked—in pig iron, probably three-quarters of a million tons was added to stock—also that our exports of iron and steel were greater than ever. Prices of finished products were such as gave most manufacturers a profitable year, though some saw their earnings cut considerably in the second half by lack of full employment, and the blast furnace industry, as a whole, suffered both from low prices and diminished sales.

But 1910 is of comparatively small interest now; the question of moment is what 1911 has in store for the iron trade. For four months the shrinkage of new orders has been pronounced and the opening of the new year shows nothing near at hand to change that tendency. Yet it is familiar history that the point is reached in the abstention of buyers where even the wear and tear of the country are not being satisfied, except as stocks are drawn upon. All through 1910 the volume of consumption has been difficult to measure. It has been accepted in a general way that it was exceeded by the output of the mills in the late months of 1909 and the early months of 1910—a period when consumers all along the line were carrying stocks more in conformity with the expansion of the iron industry and all the infinitely ramifying lines dependent upon it, after running on small margins for months following the panic. Now, we have the reverse operation and the interesting question is how far new orders and mill output have fallen below the country's actual use of iron and steel.

The iron trade would like to know how soon the present halt in buying will give way again to a free movement, and the answer involves a good deal of perplexity. For the present the industry is involved with all others in a reactionary movement which seems not yet fully to have run its course. Railroad buying for this year, as far as outlined by railroad officers, does not promise much increase, if any, over that for 1910, but pending questions may be settled in a way that will improve this outlook before the year is far advanced. So far as rails are concerned, a repetition of the 1910 tonnage would mean more than is generally appreciated. The leading interest rolled more rails in 1910 than in any previous year, though this could not be said of any other company.

It is evident that 1911 will be, in all lines, a year for the absorption of manufacturing capacity already provided, rather than for important additions through new enterprises or the expansion of those existing. The iron trade, for example, contributed much to the volume of its own business in 1909 and 1910, though less than in 1906 and 1907, by the construction work it had under way. Almost entirely the new construction of 1911 will represent the completion of that overhanging from 1910 and 1909.

In addition to the influences which affect all industries, iron and steel products have to reckon with the result of the present deadlock over prices. It is the habit of consumers to buy on a rising market or because of the prospect of an advance. Such an incentive to buying is not now in sight, and manufacturers are not yet persuaded that prices should go down in order that later they may go up. The price situation, therefore, conspires with other factors to make the first half of 1911 a period of moderate demand. In general, the disposition among the leaders in the trade is to look for a reversal of the course of 1910, and thus to expect that conditions at the end of 1911 will be considerably more favorable than at the beginning.

Foundry Features of This Issue

Without omitting the matter commonly forming a part of the first issue of *The Iron Age* in a new year, special attention has been given this week to foundry topics. Whatever may have been said 20 years ago or even 10 years ago about the backwardness of the foundry industry and the favoritism always shown the machine shop in spending money for equipment, that form of introduction to every article on a foundry subject has passed out of vogue. The foundry, with the help of a good number of talented men who have been working hard on its problems, has been finding itself, and it is by no means the object of commiseration uninformed persons still think it to be. It is not so long ago that the making of sand molds for the casting of iron was referred to as a trade for which the labor supply was increasingly inadequate. The outlook seemed to be for a more complete domina-

tion of the industry by a strong and unprogressive labor union. As far as the preparation of the metal itself was concerned, "scientific" mixing and melting were held to be more or less of an iridescent dream. In the new foundry movement the mechanical advance has been greater than the metallurgical, perhaps because the labor side of the problem was most pressing, but there is a very high and growing respect for foundry metallurgy.

Mechanical engineering found the foundryman in the grip of an apprentice ratio that was putting him more and more in the hands of the Shop Committee. Machines have sprung up, and the ratio between workers and total output has been revised without waiting for a union referendum. Naturally this side of modern foundry development is given large space in the articles prepared for this issue. These show that the most recent results with the molding machine have opened up possibilities that even five years ago were not considered as at all within reach. Along with this advance in the machine has been a most important one in foundry construction. As new shops have been laid out the designer has provided for the employment of mechanical handling, not only of molding materials, but of molds to iron or iron to molds, and we hear more of continuous pouring and of continuous core making and carrying and baking, as in the article elsewhere on "The Progress of Mechanical Engineering in the Foundry."

Of recent improvements not only in molding machines, but in other foundry equipment, interesting details are given in a group of illustrated articles on other pages, while special contributions deal with "Recent Tendencies in the Foundry Industry," "Sound Business Methods in the Foundry," "Brass Melting Furnaces," "Ornamental Castings in Permanent Molds" and "A Proposed Malleable Castings Plant." In the flood of foundry literature in the past few years, through foundrymen's associations and otherwise, some questions have become hackneyed, but our contributors have succeeded well in bringing out what is of immediate and vital interest.

Secretary Moldenke of the American Foundrymen's Association compresses into a sentence the hopeful situation of the industry to-day in saying that it has never shown better defined tendencies toward advancement—a condition he attributes to the fact that in technical equipment the present generation of foundrymen has never been equaled.

Efficiency in Railroad Management

Our readers will find much food for thought in the article presented elsewhere in this issue by Max H. C. Brombacher on "Railroad Repair Shop Efficiency." The operation of repair shops is recognized as a most important part of the general administration of railroad management. Unless they are conducted efficiently a railroad company can suffer seriously in the cost of maintaining its train service. The attention of the public having been turned in this direction it was believed that an excellent field for investigation was presented, and we accordingly commissioned Mr. Brombacher to make careful inquiry into the subject. He had previously introduced himself to the readers of *The Iron Age* by his excellent articles on efficiency in shop management, and it was believed that he was well qualified to present this subject in its true condition, both accurately and judiciously. His investigations and analyses, as presented in the article referred to, are startling. Such wide variations are shown in the cost of railroad repairs in a comparatively small number of railroad shops that the question naturally arises whether a much wider investigation would not show that a low rate of efficiency prevails in entirely too many of the railroad shops of the country. The facts and figures in Mr. Brombacher's article speak for themselves, and it is unnecessary here to enter into a further discussion of the matter.

Wood Preservation and By-Product Coking

Viewpoints upon a number of economic subjects have been changing rapidly. To the widespread interest of two years ago in conservation of natural resources is succeeding an intense interest in the reduction of manufacturing costs. To the rosy expectations of enormous expenditures for railroad improvements, as, for instance, along the line of replacing wood ties with steel ties, has succeeded the question whether the railroads will be able to make both ends meet and maintain their ability to handle expeditiously the business offered.

These trends in the course of public thought come together at curious points, and it is not uninteresting to observe that while a few years ago the interest of the iron and steel industry in the advancing cost of wood lay chiefly along the line of steel ties and steel mine timbering, occasion is now being made for the industry to take an interest in the growth of wood preservation.

Rapid progress has been made of late in the study of wood preservation, so that definite ideas are being formulated as to methods to be followed and results to be expected. Outside of some methods calculated only to prolong slightly the life of timber, and involving only a small cost, there are two general methods; one is by the use of creosote and the other by the use of zinc chloride, while the methods are differentiated in that the use of salts is very objectionable when the wood is likely to be subject to a leaching action through the presence of water. This naturally leaves the larger part of the field, including that of railroad ties in particular, to creosote.

Of the different creosotes the coal tar creosote is preferred, it being as yet uncertain whether the oil tar creosote is as good. As far as commercial trends may be taken as representing the working out of scientific information, the coal tar creosote is by far the preferable, as is illustrated by the fact that much oil tar creosote is sold as coal tar creosote, and the further fact that about three-fourths of the creosote used in the United States is imported.

The aspect of our importing creosote for wood preservation, chiefly from Germany, is very peculiar. It is a by-product in coke manufacture; and while we do practice by-product coking in the United States it is only in a relatively limited way as to tonnage, and in a very limited way as to the degree to which the development of the by-products is carried. The large production of creosote in Europe is encouraged, if not caused, by the importance of the aniline dye industry, creosote being a convenient product when the final end in view is the production of these dyes. So far

as tonnage of coke is concerned, our coke industry is more than double the size of Germany's, and it is neither pleasant nor encouraging to observe our going to Germany for creosote.

In another respect the bringing together of the United States and Germany in the matter of wood preservation is peculiar. We remain more or less familiar with the pronouncements of two or three years ago with regard to the probable duration of our forests. Recalling the data for a moment, as summed up in a Government publication, "The Drain Upon the Forests," issued November 30, 1907, we find the estimates for the probable duration of our timber supply ranged from 9 to 33 years; the estimate of time depends upon the assumptions, whether one should take the largest or the smallest estimate of the amount of standing timber, the largest or smallest estimate of annual consumption, and the existing rate of consumption or increasing rate of consumption as had been shown.

With this startling prospect of timber exhaustion in the United States a very curious fact remains, and that is this: Germany has a total forest area of 35,000,000 acres and a population of about 65,000,000. Without depleting the forests but rather getting them to produce more timber from year to year, Germany has been able to supply five-sixths of her domestic demand, so that as the actual proportion is 0.54 acre per capita, with 0.65 acre per capita Germany could supply her domestic requirements indefinitely. The United States, on the other hand, has between 500,000,000 and 600,000,000 acres of standing timber and 92,000,000 of population—say, 6 acres per capita.

In these conditions we are confronted with timber exhaustion, and are drawing upon another country for material to preserve wood. That other country can supply its wood requirements indefinitely on one-tenth as much forest land per capita as we have; while of the coke, whose manufacture involves the preservative as a by-product, that country makes less than half as much as we do.

The suggestion might possibly be made that Germany has advanced farther in the substitution of iron and steel for wood and that we merely need to let things take their course until we shall in the natural progress of events reach the same point. That suggestion would be wide of the mark. Germany in nine months of this year exported 3,576,000 metric tons of iron and steel and imported 410,000 tons, a net balance of 3,166,000 tons. In the same period the German production of pig iron was 10,923,000 tons. Allowing for the balance of exports to represent somewhat more pig iron than the actual weight, this is at the rate of domestic pig iron consumption of 10,000,000 metric tons a year, and at 65,000,000 population this figures out 340 lb. per capita.

Such bewildering changes have occurred in the pig iron production of the United States that a per capita estimate of consumption is different. We made more than 25,000,000 tons of pig iron in a calendar year as far back as 1906, but in the calendar year 1908 less than 16,000,000 tons; in the twelvemonth ended June last we made almost 30,000,000 tons, but at present we are making only about 21,000,000 tons. Making a random guess at 25,000,000 tons, and neglecting exports as offering an entirely useless refinement in computation, we have a per capita consumption of pig iron of 600 lb., with 92,000,000 population.

Thus we consume something like twice as much pig iron per capita as Germany, and with 10 times the forest acreage per capita which Germany needs for maintaining her supply we are faced with exhaustion in a decade or a quarter century.

What we find in this cursory analysis tends to enforce the preachment so often heard these days, that our economic position needs improvement. The argument in favor of by-product coking is obvious, but to many in the iron and steel industry by-product coking means no more than retort instead of beehive coking. The retort, however, is only the beginning. With the refinements shown to be feasible and profitable on the Continent, the coke may be called the by-product and the various distillates and other manufactured commodities the main product. The prospect of a large market for the so-called by-products of coke manufacture has expanded in a striking way in very recent years. In addition to the call for creosote for wood preservation there is the call for tar products to treat macadamized roads and the opportunity to use the gas profitably, through the developments in gas engines and electric machinery, whereby the gas from the retort can be converted into electric power to be offered in power markets some distance removed from the point of coking, if local requirements do not exhaust the entire supply.

Confusion Over Noncancellation Clauses

Considerable readjustment of selling agreements between machinery manufacturers and dealers is in progress, and noncancellation clauses are occupying much attention, as there are diverse views on the subject. The adoption of noncancellation clauses is not confined to the machine tool builders, who have taken action to that end through their national body, but manufacturers of other classes of mechanical equipment are giving much thought to the subject.

For self-protection many dealers in metal working equipment have recently had printed on their business letter heads the stipulation "no cancellations accepted," but occasions arise when it would be impracticable for them to adhere strictly to that policy. When such occasions arise dealers are wondering whether under new conditions they will be obliged to carry the burden of the expense involved. Some manufacturers who have of late adopted a policy of not accepting cancellations are flat-footed in their statements that they will not take back machinery when it is once ordered by a dealer, nor will they defer collections for the equipment. Others are more lenient, and are willing to meet the dealer half way by accepting a part payment for the equipment and carrying the remaining charge on their books until the dealer can dispose of the returned machinery.

There are times when it is exceedingly unwise for a seller to insist on delivering a machine when the order has been canceled. For instance, when a buyer has been badly crippled through a fire in his plant and has no immediate use for the equipment ordered, it would be disastrous to a dealer to insist on delivering the material and then wait for insurance adjustments only to learn that his customer was also financially damaged through the loss of his plant. In such an event it would seem rather hard on the dealer to have to pay the manufacturer before he could dispose of

the machine where in many cases the maker could find other customers for it. Nevertheless, some manufacturers have taken the absolute stand that they will under no conditions accept cancellations or compromise in any way. They declare that they will bill dealers, although the latter are practically their agents, 30 days after delivery and will expect prompt payments.

Recently a machine tool maker forwarded a machine to an automobile supply manufacturer through a dealer who had an exclusive sales territory agreement covering the community where the automobile supply plant was located. The customer found his credit in bad shape, and as business fell off rather suddenly he canceled the order. The dealer having knowledge of the supply man's lack of funds cheerfully accepted the cancellation, but the manufacturer, when notified of the facts in the case, refused to accept the returned machine. He called the dealer's attention to the inflexibility of the noncancellation clause and insisted on collecting from the dealer who was obliged to carry $4000 worth of machinery in stock until he could find a customer.

In cases where special machinery is made to order or machine tools have special scales, such drastic measures as this might be permissible, but otherwise the advisability of such a policy is open to question. It is true that loosely constructed selling agreements, such as formerly existed between manufacturers and dealers, in some cases have brought hardship on the maker through the cancellation of orders for specially constructed machines.

It has been the custom for manufacturers of mechanical equipment in many lines to ship dealers a reasonable amount of machinery for stock and await payment until a sale is made. Under the new conditions some machinery makers have announced that they will provide no machines for stock until they are paid for. In some instances, at least, the manufacturers' line of machinery is a very desirable one for dealers to handle, and many of them are seriously debating the question of acceding to the makers' demand. They foresee that if they do other manufacturers will adopt the same policy, which to them appears arbitrary. Other machinery makers have agreed to accept part payment for machines ordered by dealers for stock. On the other hand, many manufacturers claim that dealers frequently exercise little judgment in ordering for stock and place requisitions indiscriminately, regardless of their prospects for disposing of the equipment.

Correspondence

The Problem of Blast Furnace Efficiency

To the Editor: I have been very much interested in your editorials and in Mr. Brombacker's letters upon various phases of efficiency engineering. It is surprising what wide interest has suddenly developed in this line of work since the recent rate hearings, and I believe the industrial world will some time come to realize its debt to Mr. Brandeis and Mr. Emerson for bringing this important subject so prominently to the public notice.

There is one field for efficiency work which, so far as I know, is thus far practically untouched. I refer to the manufacture of iron, which, although it is not one of the least efficient industries, still offers many opportunities for economy, particularly in the South, where the materials are more varied and the practice less standardized. During the last few years I have had the opportunity of making some investigations along this line and am confident that in nearly all cases some saving could be made, running up in a few instances to as high as $1 per ton. A few examples which have come to my notice may serve to emphasize this statement.

At a brown ore mine the sand screened out and wasted ran higher in iron than the ore which was shipped. In some instances the ores used contain an excessive amount of slate, which could be easily removed by means of a picking belt. The saving in fuel would far more than offset the cost of picking. The coke is often unnecessarily high in ash, due to poor practice in washing the coal and to excessive drafting of the ovens. The blast temperature is frequently not as high as could be obtained and used because of incomplete combustion of the gas and general bad handling of the stoves. Excessive leakage of steam in the engine room introduces an unnecessarily large amount of moisture into the furnace.

The chief item of cost in the manufacture of iron in the South is fuel, and any successful efficiency system must take this into consideration. In this connection we are immediately up against the difficulty of determining the efficiency with which fuel is used in the blast furnace, the various factors which influence fuel consumption, and the quantitative effect of each. I hope in the near future to publish a paper setting forth a scientific basis by means of which these problems may be worked out.

In conclusion, I wish to assert my belief that under the present system of organization it is rarely possible for any one man to accomplish all that should be done along this line. Certainly it is not in the power of the usually overburdened furnace superintendent. What is needed is an efficiency organization independent of the operating department, but comparable, as Mr. Emerson has pointed out in his delightful book on "Efficiency," with the staff of the modern military system.

JOHN JERMAIN PORTER.
UNIVERSITY OF CINCINNATI, December 27, 1910.

A Wire Rope Trade Inquiry

The Broderick & Bascom Rope Company, manufacturer of wire rope, St. Louis, Mo., addressed sixty or more of its agents scattered throughout the country, taking in every State, asking for their views concerning the outlook for trade for 1911. A summary of the replies has been printed by the company. These replies, with very few exceptions, take an exceedingly hopeful view of business for the coming year. The wire rope trade is regarded by the company as a fair barometer of the general commercial condition from the fact that it is not confined to any one line, wire rope being largely used in lumber and logging camps and by oil well drillers, mining companies and boat builders, elevator builders, contractors, &c., so that consumers' interests are much diversified. The tenor of these replies is radically different from the views of James J. Hill, published by the Associated Press about December 1, which caused the inquiry to be made by the company. The Broderick & Bascom Rope Company states its opinions that 1911 will be a banner year unless trade should be interfered with by tariff tinkering, adverse railroad legislation or general labor troubles.

The Nelson Valve Company, Chestnut Hill, Philadelphia, Pa., has got out a danger sign for the use of men working around steam and electrical machinery. It is intended to be placed on an engine or machine when it is undergoing repairs, so that there will be no excuse for accidents occurring because a throttle was opened or a switch was closed while repairs were being made. These signs are of red cardboard, 6 in. in diameter, and have on both sides a skull in white and the legend "Danger—Hands Off" in large red letters on a white background. All persons who can make use of a supply of these signs can secure them by addressing the company.

Pig Iron Production

Sharply Cut Down in December

Daily Rate 6400 Tons Less Than in November

The production of coke and anthracite iron fell off greatly in December, the total being 1,774,817 tons, against 1,909,780 tons in November. There was a net loss of 27 in the list of active furnaces, leaving 188 in blast January 1 against 215 December 1. The average daily production last month was 57,252 tons, or about 6400 tons less than the daily average in November. The falling off was almost entirely in output of steel works furnaces, merchant furnace output declining less than 900 tons a day.

It is now possible to approximate the pig iron production of 1910. We estimate it to be in excess of 27,250,000 tons, as against 25,795,471 tons in 1909, an increase of more than 1,450,000 tons. The following table shows the production in gross tons by half years since 1907:

	1907.	1908.	1909.	1910.
First half	13,478,044	6,018,004	11,022,346	15,012,392
Second half	12,303,317	9,018,014	14,773,125	*12,250,000
Totals	25,781,361	15,936,018	25,795,471	.....

* Estimated.

The above estimate of 12,250,000 tons for the second half of 1910 is based on an estimated production of 160,000 tons of charcoal iron. This figure may be exceeded.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, beginning with December, 1909, is as follows:

Daily Rate of Pig Iron Production by Months.—Gross Tons.

	Steel works.	Merchant.	Total.
December, 1909	57,058	27,964	85,022
January, 1910	57,200	26,948	84,148
February	57,876	27,740	85,616
March	56,113	28,346	84,459
April	55,663	27,129	82,792
May	52,235	24,867	77,102
June	51,637	23,879	75,516
July	47,183	22,122	69,305
August	46,534	21,429	67,963
September	47,007	21,536	68,542
October	45,794	21,726	67,520
November	41,427	22,232	63,659
December	35,909	21,343	57,252

December Output by Districts

The table below gives the production of all coke and anthracite furnaces in December and the four months preceding:

Monthly Pig Iron Production.—Gross Tons.

	August. (31 days)	Sept. (30 days)	Oct. (31 days)	Nov. (30 days)	Dec. (31 days)
New York	158,666	148,999	147,894	142,610	142,674
New Jersey	19,177	18,773	19,115	18,284	15,437
Lehigh Valley	63,878	63,919	69,327	62,161	68,531
Schuylkill Val.	64,926	60,689	61,673	54,642	51,466
Lower Susquehanna and Lebanon Val.	54,442	53,750	54,072	50,370	51,888
Pittsburgh dis.	510,352	505,342	507,508	445,083	397,379
Shenango Val.	113,500	108,114	112,026	82,904	82,706
West. Penn	116,117	115,622	126,098	87,568	81,957
Md., Va. and Kentucky	76,477	68,398	67,926	58,772	61,045
Wheeling dis.	68,341	74,143	76,581	84,390	74,225
Mahoning Val.	211,575	201,986	202,667	180,717	162,349
Central and North. Ohio.	122,960	111,958	117,902	108,599	112,662
Hocking Valley, Hanging Rock and S.W.Ohio.	32,490	27,657	24,029	25,008	28,759
Mich.,Minn.,Mo., Wis.,Col.,Wash.	66,096	63,935	72,825	78,927	68,313
Chicago dis.	258,145	259,672	246,504	239,469	197,340
Alabama	140,015	148,755	160,077	165,512	148,625
Tenn., Georgia and Texas	29,690	24,563	26,897	24,764	29,461
Totals	2,106,847	2,056,275	2,093,121	1,909,780	1,774,817

Among furnaces blown out in December were one Lock Ridge in the Lehigh Valley, one Steelton (banked) and one Lebanon in the Susquehanna Valley, three Carrie, one Edgar Thomson, Clinton and one Aliquippa in the Pittsburgh district, Hall in the Shenango Valley, Bellefonte and Punxy in western Pennsylvania, one Sparrows Point in Maryland, two Mingo in the Wheeling district, one Hubbard in the Mahoning Valley, Jisco in the Hanging Rock district, one Joliet, three South Chicago and one Gary in the Chicago district, one Colorado at Pueblo, one Zug Island and the Detroit Furnace Company stack (banked) at Detroit, one Pioneer, Trussville, two Ensley and one Vanderbilt in Alabama. Among furnaces blown in were one Bethlehem in the Lehigh Valley, one McKeesport in the Pittsburgh district, one Cambria at Johnstown and Rockdale in Tennessee.

Capacity in Blast January 1 and December 1

The following table shows the daily capacity of furnaces in blast January 1 and December 1. These figures are based largely on the performance of the furnaces in the past two months, and include the capacity of furnaces merely banked during part of the holidays:

Coke and Anthracite Furnaces in Blast and Capacity.—Gross Tons.

Location of furnaces.	Total number of stacks.	January 1. Number in blast.	January 1. Capacity per day.	December 1. Number in blast.	December 1. Capacity per day.
New York:					
Buffalo	17	12	4,034	12	4,067
Other New York	7	3	568	3	565
New Jersey	7	2	502	2	508
Spiegel	2	..	....	..	....
Pennsylvania:					
Lehigh Valley	23	11	2,062	11	1,942
Spiegel	3	1	84	1	81
Schuylkill Valley	16	6	1,660	6	1,762
Low. Susquehanna	7	4	690	5	861
Lebanon Valley	10	5	710	6	820
Pittsburgh district	50	29	11,890	34	13,686
Spiegel	3	1	134	1	120
Shenango Valley	20	8	2,541	9	2,623
West. Penn	27	11	2,763	12	2,769
Maryland	4	2	530	3	710
Wheeling district	14	5	1,725	7	2,675
Ohio:					
Mahoning Valley	23	15	5,286	16	5,705
Central and North.	22	10	3,455	10	3,620
Hocking Val., Hanging Rock and S. W. Ohio	15	7	910	8	984
Illinois and Indiana	31	13	5,605	18	7,705
Spiegel	3	1	175	1	100
Michigan, Wisconsin and Minnesota	10	5	1,104	7	1,476
Colorado, Missouri and Washington	7	2	708	4	1,085
The South:					
Virginia	23	8	893	8	879
Kentucky	5	2	320	2	344
Alabama	46	16	3,794	21	5,096
Tenn. and Georgia	20	9	904	8	896
Totals	415	188	53,047	215	61,079

Production of Steel Companies

Returns from all plants of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies.—Gross Tons.

	Pig.—Total production. 1908.	1909.	1910.	Spiegeleisen and ferromanganese. 1909.	1910.
January	664,415	1,117,823	1,773,201	12,325	19,538
February	745,802	1,073,363	1,620,539	10,046	21,396
March	841,502	1,140,553	1,739,212	23,743	25,591
April	725,548	1,093,092	1,669,898	22,478	22,304
May	759,674	1,256,448	1,619,283	20,834	26,529
June	717,689	1,365,527	1,549,112	16,516	27,680
July	798,639	1,508,762	1,462,689	17,613	22,924
August	897,052	1,591,991	1,442,572	22,313	25,756
September	933,514	1,660,839	1,410,221	28,148	15,151
October	996,481	1,769,094	1,419,624	25,384	8,500
November	981,167	1,689,994	1,242,804	23,376	9,032
December	1,090,339	1,768,799	1,113,174	20,791	12,178

Graphic Chart of Pig Iron Production and Prices

The fluctuations in pig iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron delivered at Chicago. They are based on the weekly market quotations of *The Iron Age*. The two sets of figures are as follows:

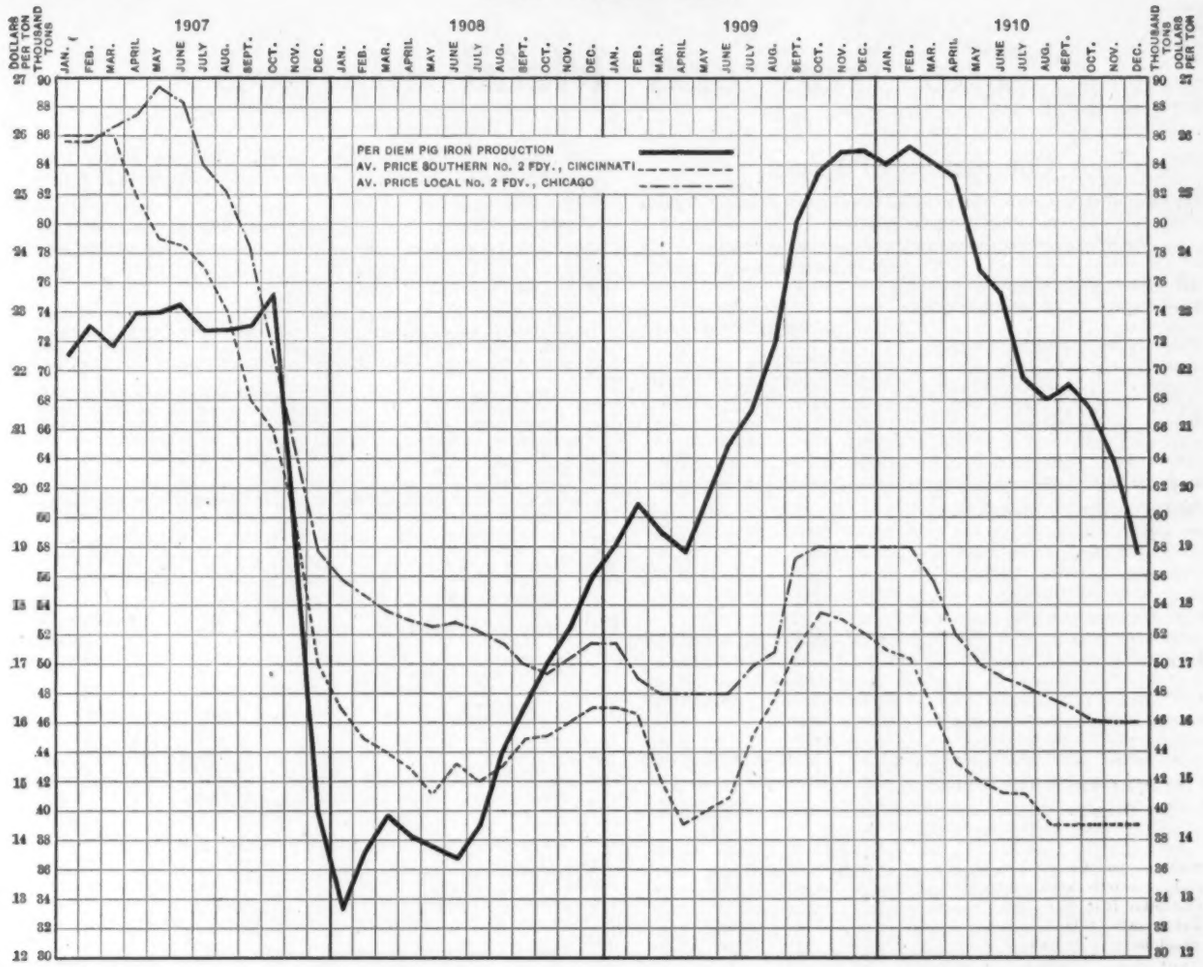


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to January 1, 1911; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron Delivered at Chicago.

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907.—Gross Tons.

	1907.	1908.	1909.	1910.
January	71,149	53,718	57,975	84,148
February	73,038	37,163	60,976	85,616
March	71,821	39,619	59,232	84,459
April	73,885	38,289	57,962	82,792
May	74,048	37,603	60,753	77,102
June	74,486	36,444	64,656	75,516
July	72,763	39,287	67,793	69,305
August	72,594	43,851	72,546	67,963
September	72,783	47,300	79,507	68,476
October	75,386	50,554	83,856	67,520
November	60,937	52,595	84,917	63,659
December	39,815	56,158	85,022	57,252

Monthly Average Prices in Dollars of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry at Chicago Since January, 1907.

	1907.		1908.		1909.		1910.	
	Sou. No. 2 Cin.	Loc. No. 2 Chi.	Sou. No. 2 Cin.	Loc. No. 2 Chi.	Sou. No. 2 Cin.	Loc. No. 2 Chi.	Sou. No. 2 Cin.	Loc. No. 2 Chi.
Jan.	26.00	25.85	16.15	18.45	16.25	17.35	17.25	19.00
Feb.	26.00	25.85	15.75	18.16	16.13	16.75	17.06	19.00
March	26.00	26.10	15.50	17.85	15.05	16.50	16.30	18.30
April	25.06	26.35	15.20	17.73	14.25	16.50	15.37	17.50
May	24.25	26.85	14.75	17.63	14.50	16.50	15.00	17.06
June	24.10	26.60	15.25	17.73	14.70	16.50	14.85	16.75
July	23.85	25.55	15.00	17.55	15.75	17.00	14.75	16.56
Aug.	23.00	24.85	15.25	17.35	16.38	17.13	14.31	16.50
Sept.	21.50	24.10	15.65	17.05	17.35	18.70	14.25	16.40
Oct.	20.95	22.45	15.75	16.85	17.88	19.00	14.25	16.06
Nov.	19.50	20.66	16.00	17.10	17.75	19.00	14.25	16.00
Dec.	17.00	18.80	16.25	17.35	17.45	19.00	14.25	16.00

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907.—Gross Tons.

	1907.	1908.	1909.	1910.
January	2,205,607	1,045,250	1,797,560	2,608,605
February	2,045,068	1,077,740	1,707,340	2,397,254
March	2,226,457	1,228,204	1,832,194	2,617,949
April	2,216,558	1,149,602	1,738,877	2,483,763
May	2,295,505	1,165,688	1,883,330	2,390,180
June	2,234,575	1,092,131	1,930,866	2,265,478
July	2,255,660	1,218,129	2,103,431	2,148,442
August	2,250,410	1,359,831	2,248,930	2,106,847
September	2,183,487	1,418,998	2,385,206	2,056,275
October	2,336,972	1,567,198	2,590,541	2,093,121
November	1,828,125	1,577,854	2,547,508	1,909,780
December	1,234,279	1,740,912	2,635,680	1,774,817

J. A. Farrell, president of the United States Steel Products Company, has returned from Europe.

President Corey Resigns

Announcement is made of the resignation of William E. Corey, who has been president of the United States Steel Corporation since 1903. The following statement has been given out by Chairman Elbert H. Gary, on behalf of the corporation:

After more than seven years of faithful service as president of the United States Steel Corporation, William E. Corey has tendered his resignation, to take effect at the pleasure of the Board of Directors. The resignation will be presented to the board for consideration and action in due time, and the Finance Committee will then present its recommendations concerning the subject matter.

It is the present opinion of the members of the Finance Committee that there should not be elected a successor as president in the immediate future, if at all. The experience and talents of Mr. Corey have best fitted him to take charge of the manufacturing and commercial departments, and his attention has been largely confined to that service. However, as the manufacturing companies are all thoroughly equipped with the very best talent, including such as the above mentioned branches need, the strength of the organization will not be diminished. The Finance Committee may recommend the election of a vice-president or two vice-presidents, who will be expected to take special charge of different departments, and it is intended to strengthen the whole organization in every respect practically and useful.

The relations between Mr. Corey and the members of the board and of the Finance Committee, respectively, as well as all the officers of the United States Steel Corporation and subsidiary companies have been most pleasant and agreeable. Mr. Corey severs his connection with a feeling of loyalty to, and friendship for, the corporation and its interests, and takes with him the best wishes of all who are connected with the companies above referred to.

Mr. Corey has discharged his duties with signal ability. Under his administration the efficiency of the great plants owned by the corporation has not only been maintained at the highest standard of excellence, but their productive capacity has been largely augmented on lines which have added greatly to the earnings and profits of the corporation.

The Iron and Metal Markets

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Jan. 4, 1911.	Dec. 28, 1910.	Dec. 7, 1910.	Jan. 5, 1910.
PIG IRON, Per Gross Ton:				
Foundry No. 2, standard, Philadelphia	$15.50	$15.50	$15.50	$19.00
Foundry No. 2, Southern, Cincinnati	14.25	14.25	14.25	17.25
Foundry No. 2, local, Chicago	*15.50*	16.00	16.00	19.00
Basic, delivered, eastern Pa.	14.75	14.75	14.75	18.75
Basic, Valley furnace	13.25	13.25	13.50	17.00
Bessemer, Pittsburgh	15.90	15.90	15.90	19.90
Gray forge, Pittsburgh	13.90	13.90	13.90	17.40
Lake Superior charcoal, Chicago	18.00	18.00	18.00	19.50
BILLETS, &c., Per Gross Ton:				
Bessemer billets, Pittsburgh	23.00	23.00	23.00	27.50
Forging billets, Pittsburgh	28.00	28.00	....	31.00
Open hearth billets, Philadelphia	25.40	25.40	25.50	30.60
Wire rods, Pittsburgh	28.00	28.00	28.00	33.00
OLD MATERIAL, Per Gross Ton:				
Iron rails, Chicago	15.50	15.50	16.00	20.00
Iron rails, Philadelphia	17.00	17.00	18.00	20.50
Car wheels, Chicago	*13.00*	13.50	13.50	18.50
Car wheels, Philadelphia	13.00	13.00	13.75	17.50
Heavy steel scrap, Pittsburgh	13.50	13.50	13.75	18.00
Heavy steel scrap, Chicago	*11.50*	12.00	12.25	16.00
Heavy steel scrap, Philadelphia	12.50	12.50	12.75	17.00
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Bessemer steel rails, heavy, at mill	1.25	1.25	1.25	1.25
Refined iron bars, Philadelphia	1.32½	1.32½	1.35	1.65
Common iron bars, Chicago	*1.30*	1.35	1.35	1.60
Common iron bars, Pittsburgh	1.35	1.35	1.40	1.70
Steel bars, tidewater, New York	1.56	1.56	1.56	1.66
Steel bars, Pittsburgh	1.40	1.40	1.40	1.50
Tank plates, tidewater, New York	1.56	1.56	1.56	1.71
Tank plates, Pittsburgh	1.40	1.40	1.40	1.55
Beams, tidewater, New York	1.56	1.56	1.56	1.71
Beams, Pittsburgh	1.40	1.40	1.40	1.55
Angles, tidewater, New York	1.56	1.56	1.56	1.71
Angles, Pittsburgh	1.40	1.40	1.40	1.55
Skelp, grooved steel, Pittsburgh	1.25	1.25	1.25	1.50
Skelp, sheared steel, Pittsburgh	1.30	1.30	1.30	1.60
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.20	2.20	2.15	2.40
Wire nails, Pittsburgh*	1.70	1.70	1.70	1.85
Cut nails, Pittsburgh	1.60	1.60	1.60	1.85
Barb wire, galv., Pittsburgh*	2.00	2.00	2.00	2.15
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	13.00	13.00	13.00	14.00
Electrolytic copper, New York	12.75	12.75	12.87½	13.75
Spelter, New York	*5.55*	5.60	6.00	6.30
Spelter, St. Louis	*5.40*	5.50	5.85	6.15
Lead, New York	4.50	4.50	4.50	4.70
Lead, St. Louis	4.35	4.35	4.35	4.65
Tin, New York	**39.55**	38.45	37.95	33.40
Antimony, Hallett, New York	*7.55*	7.75	7.75	8.25
Tin plate, 100-lb. box, New York	$3.84	$3.84	$3.84	$3.84

* These prices are for largest lots to jobbers.

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought boiler tubes.

Structural Material.—I-beams and channels, 3 to 15 in., inclusive, 1.40c. to 1.45c., net; I-beams over 15 in., 1.50c. to 1.55c., net; H-beams over 8 in., 1.55c. to 1.60c.; angles, 3 to 6 in., inclusive, ¼ in. and up, 1.40c. to 1.45c., net; angles over 6 in., 1.50c. to 1.55c., net; angles, 3 in., on one or both legs, less than ¼ in. thick, 1.45c., plus full extras as per steel bar card, effective September 1, 1909; tees, 3 in. and up, 1.40c. to 1.45c., net; tees, 3 in. and up, 1.40c. to 1.45c., net; angles, channels and tees, under 3 in., 1.45c., base, plus full extras as per steel bar card of September 1, 1909; deck beams and bulb angles, 1.70c. to 1.75c., net; hand rail tees, 2.50c.; checkered and corrugated plates, 2.50c., net.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.40c. to 1.45c. base. Following are stipulations prescribed by manufacturers, with extras to be added to base price (per pound) of plates:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼-in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼-in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Gauges under ¼-in. to and including 3-16-in. on thinnest edge	$0.10
Gauges under 3-16-in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates), 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

TERMS.—Net cash 30 days.

Sheets.—Makers' prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual discounts for small lots from store, are as follows: Blue annealed sheets, Nos. 3 to 8, U. S. standard gauge, 1.55c.; Nos. 9 and 10, 1.65c.; Nos. 11 and 12, 1.70c.; Nos. 13 and 14, 1.75c.; Nos. 15 and 16, 1.85c. One pass, cold rolled, box annealed sheets, Nos. 10 to 12, 1.85c.; Nos. 13 and 14, 1.90c.; Nos. 15 and 16, 1.95c.; Nos. 17 to 21, 2c.; Nos. 22, 23 and 24, 2.05c.; Nos. 25 and 26, 2.10c.; No. 27, 2.15c.; No. 28, 2.20c.; No. 29, 2.25c.; No. 30, 2.35c. Three pass cold rolled sheets, box annealed, are as follows: Nos. 15 and 16, 2.05c.; Nos. 17 to 21, 2.10c.; Nos. 22 to 24, 2.15c.; Nos. 25 and 26, 2.20c.; No. 27, 2.25c.; No. 28, 2.30c.; No. 29, 2.35c.; No. 30, 2.45c. Galvanized sheets, Nos. 10 and 11, black sheet gauge, 2.20c.; Nos. 12, 13 and 14, 2.30c.; Nos. 15, 16 and 17, 2.45c.; Nos. 18 to 22, 2.60c.; Nos. 23 and 24, 2.70c.; Nos. 25 and 26, 2.90c.; No. 27, 3.05c.; No. 28, 3.20c.; No. 29, 3.30c.; No. 30, 3.50c. Painted roofing sheets, No. 28, $1.55 per square. Galvanized sheets, No. 28, $2.75 per square for 2½-in. corrugations. All above prices are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount 10 days from date of invoice.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from October 1:

	Steel. Black.	Steel. Galv.	Iron. Black.	Iron. Galv.
Butt Weld.				
⅛, ¼, ⅜ in.	72	58	68	54
½ in.	75	63	71	59
¾ to 1½ in.	79	69	75	65
2 to 3 in.	80	70	76	66
Lap Weld.				
2 in.	76	66	72	62
2½ to 4 in.	78	68	74	64
4½ to 6 in.	77	67	73	63
7 to 12 in.	75	59	71	55
13 to 15 in.	51½	..	..	..
Butt Weld, extra strong, plain ends, card weights.				
⅛, ¼, ⅜ in.	69	59	65	55
½ in.	74	68	70	64
¾ to 1½ in.	78	72	74	68
2 to 3 in.	79	73	75	69
Lap Weld, extra strong, plain ends, card weight.				
2 in.	75	69	71	65
2½ to 4 in.	77	71	73	67
4½ to 6 in.	76	70	72	66
7 to 8 in.	69	59	65	55
9 to 12 in.	64	54	60	50
Butt Weld, double extra strong, plain ends, card weight.				
¼ in.	64	58	60	54
⅜ to 1¼ in.	67	61	63	57
2 to 3 in.	69	63	65	59
Lap Weld, double extra strong, plain ends, card weight.				
2 in.	65	59	61	55
2½ to 4 in.	67	61	63	57
4½ to 6 in.	66	60	62	56
7 to 8 in.	59	49	55	45

THE IRON AND METAL MARKETS

Plugged and Reamed.

1 to 1½, 2 to 3 in...Butt Weld } Will be sold at two (2) points lower basing (higher price) than merchant or card weight pipe, Butt or Lap Weld as specified.

2, 2½ to 4 in.....Lap Weld }

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

	Steel.	Iron.
1 to 1¼ in.	49	43
1¾ to 2¼ in.	61	43
2½ in.	63	48
2¾ to 5 in.	69	55
6 to 13 in.	61	43

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads to destinations east of the Mississippi River will be sold at delivered discounts for carloads lowered by two points, for lengths 22 ft. and under; longer lengths, f.o.b. Pittsburgh.

Wire Rods.—Bessemer rods, $28; open hearth and chain rods, $28.

Steel Rivets.—Structural rivets, ¾ in. and larger, 1.90c., base; cone head boiler rivets, ¾ in. and larger, 2c., base; ⅝ in. and 11-16 in. take an advance of 15c., and ½ in. and 9-16 in. take an advance of 50c.; in lengths shorter than 1 in. also take an advance of 50c. Terms are 30 days, net cash, f.o.b. mill.

Pittsburgh

PARK BUILDING, January 4, 1911.—(*By Telegraph.*)

Pig Iron.—There is some inquiry for Bessemer and basic iron for first half, but as yet none of this business has gone through. One lot of 5000 tons of Bessemer and another of 2500 tons are wanted. A local interest has bought 2000 tons of No. 2 foundry for first half at $13.75 to $14, Valley furnace, and there is an inquiry out for 3000 tons of gray forge for second quarter delivery, on which $13, Valley furnace, has been quoted. Pig iron is still piling up in the valleys and further restriction in output seems imperative. A meeting of basic pig iron makers was held in Cleveland on Monday, but so far little progress has been made toward uniting the basic furnace interests in the two valleys. One large maker has so far refused to join, and without his co-operation the movement is hardly likely to be successful. Prices are largely nominal, as not enough is being sold to test the market. We quote Bessemer iron nominally at $15; basic, $13.25; No. 2 foundry, $13.75 to $14, and gray forge, $13, all at Valley furnace, with a freight rate of 90 cents a ton to Pittsburgh.

Steel.—Consumers of billets and sheet and tin bars are taking in only such quantities as are required to meet current needs. We note a sale of 1500 tons of open hearth billets to a local consumer at $23, Pittsburgh. We quote Bessemer and open hearth billets, 4 x 4 in. and up to, but not including, 10 x 10 in., at $23, base, and sheet and tin bars in 30-ft. lengths, $24, f.o.b. Pittsburgh or Youngstown, full freight to destination added. We quote 1½-in. billets at $24 and forging billets at $28, base, usual extras for sizes and carbons, f.o.b. Pittsburgh or Youngstown districts, freight to destination added.

(*By Mail.*)

Several of the leading steel mills report that actual orders for structural material, plates and bars sent to the mills in December for rolling were slightly larger than in November. This is the only encouraging feature of the situation that can be reported this week. The fact remains that consumers are not buying more than what they actually must have. The announcement that the leading steel manufacturers would hold a series of meetings in New York, commencing January 9, has probably served to increase the uncertainty that exists in the trade relative to the maintenance of present prices. It is known that a number of consumers were ready to place some good sized orders this week, but most of them will hold off until the meetings are over. Operations among the steel mills are not over 50 per cent. of capacity and probably slightly less. The Carnegie Steel Company blew out three Carrie furnaces, one Edgar Thomson and two Mingo furnaces during December and may blow out more this month. The average price of Bessemer pig iron in December is given as $15, and basic $13.40 at Valley furnace, but hardly enough pig iron was sold last month to establish a market. The regular Bessemer and open hearth billet prices are being shaded by several outside mills. Coke and scrap are dull, with prices weak.

Ferromanganese.—In the absence of sales, we quote foreign 80 per cent. at $38, Baltimore, for delivery through first half of this year, the freight to Pittsburgh being $1.95 a ton.

Ferrosilicon.—There is no new inquiry, and no actual sales have been reported in this market for several weeks. We quote 50 per cent. for delivery over first half at $54 to $55, and for prompt delivery at $55 to $55.50. We quote 10 per cent, blast furnace silicon at $23; 11 per cent., $24; 12 per cent., $25, f.o.b. cars Jisco and Ashland furnaces.

Skelp.—A sale of upward of 2000 tons of narrow grooved steel skelp by a pipe mill is reported on the basis of 1.25c., delivered buyer's mill. Consumers are pretty well covered over the next three months, some of them on sliding scale contracts. We quote grooved steel skelp, 1.25c. to 1.30c.; sheared steel skelp, 1.30c. to 1.35c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.70c. to 1.75c., all for delivery at consumers' mills in the Pittsburgh district, usual terms.

Rods.—New inquiries are light and only for small lots. Specifications against contracts, especially from the chain manufacturers, have not been coming in at a satisfactory rate for several months. We quote Bessemer and open hearth rods at $28, and it is stated that this price can be shaded.

Muck Bar.—We quote best grades of muck bar, made from all pig iron, at nominally $29, Pittsburgh. No sales have been made fr some time.

Steel Rails.—The Carnegie Steel Company has received several fairly large orders for standard sections from frog and switch companies for delivery over 1911, and also taken several contracts for standard section rails for export. The same company has also sold 50,000 pairs of splice bars for reasonably prompt shipment to the Louisville & Nashville Railroad. Quotations on light rails are as follows: 12-lb. rails, 1.25c.; 16, 20 and 25 lb., 1.21c. to 1.25c.; 30 and 35 lb., 1.20c., and 40 and 45 lb., 1.16c. The prices are f.o.b. at mill, plus freight, and are the minimum of the market on carload lots, small lots being sold at a little higher price. We quote standard sections at 1.25c. per pound.

Plates.—Some good sized inquiries for steel cars are in the market, in addition to those noted in this report last week. The Kanawha & Michigan Railroad is inquiring for 3000, the Wabash-Pittsburgh Terminal for 2000, the Pennsylvania for 3000, Pittsburgh, Shawmut & Northern for 2000, and the Buffalo, Rochester & Pittsburgh for 3500. It is stated that the Pennsylvania Railroad will soon have inquiries out for a much larger number than mentioned above. Last week the Baltimore & Ohio placed orders for 1000 steel underframe cars, 500 going to the American Car & Foundry Company and 500 to the Haskell & Barker Car Company. M. A. Hanna & Co., Cleveland, have recently placed contracts for an ore boat, the plates and shapes, about 3500 tons, going to the Carnegie Steel Company. Inquiries have not yet come out for the plates and shapes for the two boats to be built by the Pittsburgh Steamship Company. We quote ¼ in. and heavier plates, both in narrow and wide sizes, at 1.40c., Pittsburgh.

Structural Material.—New inquiries are light. The McClintic-Marshall Construction Company has taken 800 tons for a new steel building for the Standard Sanitary Mfg. Company at New Brighton, the material to be furnished by the Bethlehem Steel Company. The Cambria Steel Company has taken about 300 tons for an extension to a steel building for the Westinghouse Air Brake Company at Wilmerding, Pa. We quote beams and channels up to 15 in. at 1.40c., Pittsburgh.

Sheets.—The sheet trade is better, in that prices are being well maintained, but the new demand has not shown improvement. Some of the mills report they are operating close to full capacity, while others are running only from 50 to 60 per cent. Roofing sheets are particularly quiet, as outside building operations are practically at a standstill. The full schedule of prices is printed on a previous page.

Tin Plate.—Little new business is being placed, this being the off season in the tin plate trade. The leading makers state that specifications on the large contracts booked within the last two months from the meat packers and can makers are coming in quite freely. We quote $3.60 per base box for 100-lb. cokes, f.o.b. Pittsburgh.

Bars.—Inquiries for hard steel bars for concrete reinforcement purposes are heavy, the consumption of bars for this purpose steadily increasing. The new demand for soft steel bars and common iron bars is quiet, but specifications are coming in fairly well. We quote soft steel bars at 1.40c. and common iron bars at 1.35c., base, f.o.b. Pittsburgh.

Hoops and Bands.—The trade is still placing only small orders to meet current needs, and specifications against contracts are only fair. We quote hoops at 1.50c.; bands, 1.40c. in carload and larger lots and 1.45c. in small lots, the latter carrying extras as given in the steel bar card dated September 1, 1909.

Cotton Ties.—The season is practically over and shipments on contracts have about been finished. The general price on cotton ties is 78½c. per bundle.

Spikes.—No large orders for railroad spikes have been placed in the past week. Several leading Western roads are

THE IRON AND METAL MARKETS

figuring on their requirements for 1911 and are expected to be in the market shortly. We quote standard sizes of railroad spikes at 1.50c. to 1.55c. for Western shipment and 1.55c. to 1.60c. for local trade. We quote small railroad and boat spikes at 1.60c. to 1.65c., base, in carload and larger lots.

Spelter.—Offers of spelter to local consumers in the past few days at 5.30c., East St. Louis, have been turned down. We quote prime grades at 5.25c., East St. Louis, equal to 5.37½c., Pittsburgh.

Merchant Steel.—New orders and specifications against contracts in December were only fair, but may show betterment this month, a good many consumers having asked that shipments be held up until after inventory period. Prices are fairly strong. We quote, f.o.b. Pittsburgh: Iron finished tire, 1½ x ½ in. and heavier, 1.40c., base; under these sizes, 1.55c.; planished tire, 1.60c.; channel tire, 1.80c., base; toe calk, 1.90c.; flat sleigh shoe, 1.55c.; concave or convex, 1.75c.; cutter shoes, tapered or bent, 2.25c.; spring steel, 2c.; machinery steel, smooth finish, 1.90c.

Shafting.—Specifications against contracts are coming in a little better from automobile makers, but are still slow from the implement trade. New orders run to small lots only to meet current needs. Regular discounts on cold rolled steel shafting are 57 per cent. off in carload and larger lots and 52 per cent. off in small lots delivered in base territory.

Rivets.—Users of rivets are placing orders only in small lots, and specifications against contracts are not very satisfactory. It is stated that prices are being fairly well maintained.

Wire Products.—The new demand for wire nails and wire is light, being only for small lots to meet current needs and to help distributers to keep up stocks. It is expected that in the latter part of January the demand will materially improve in anticipation of the opening up of spring trade. It is said that prices are being well maintained. We quote galvanized barb wire at $2; painted, $1.70; annealed fence wire, $1.50; galvanized, $1.80; wire nails, $1.70, and cut nails, $1.60, in carload and larger lots, all f.o.b. Pittsburgh, freight to destination being added.

Merchant Pipe.—Current new business in merchant pipe is fairly good, but shipments by the mills in December show a falling off as compared with November. The Tri-State Gas Company is reported as about to come in the market for a fairly large gas line to be laid in northern Pennsylvania. The Louisiana Gas Company, Shreveport, La., has placed a contract with a local mill for 20 miles of 8-in. pipe. Stocks held by jobbers are very low, and it is therefore expected that the demand will shortly improve. Discounts on both iron and steel pipe are stated to be quite well maintained.

Boiler Tubes.—The mills have recently entered some nice locomotive tube orders and more are in sight. Merchant tubes are dull and discounts are still being more or less shaded.

Iron and Steel Scrap.—Little material was sold by dealers to consumers in the last half of December, and shipments against contracts were largely held up, owing to inventory period. It is expected that the demand will show betterment this month. Prices are without change, but are weak. Dealers quote about as follows, per gross ton, f.o.b. Pittsburgh or elsewhere, as noted:

Heavy steel scrap, Steubenville, Follansbee, Sharon, Monessen and Pittsburgh delivery	$13.50 to $13.75
No. 1 foundry cast	13.50 to 13.75
No. 2 foundry cast	12.75 to 13.00
Bundled sheet scrap, at point of shipment	9.00
Rerolling rails, Newark and Cambridge, Ohio, and Cumberland, Md.	14.75 to 15.00
No. 1 railroad malleable stock	13.00 to 13.25
Grate bars	11.25 to 11.50
Low phosphorus melting stock	17.25 to 17.50
Iron car axles	24.00 to 24.50
Steel car axles	20.25 to 20.50
Locomotive axles	24.00 to 24.50
No. 1 busheling scrap	12.25 to 12.50
No. 2 busheling scrap	8.75 to 9.00
Old car wheels	13.50 to 13.75
Sheet bar crop ends	15.75 to 16.00
Cast iron borings	7.90 to 8.00
Machine shop turnings	8.60 to 8.75
Old iron rails	16.00 to 16.25
No. 1 wrought scrap	14.50 to 14.75
Stove plate	14.50 to 14.75
Heavy steel axle turnings	10.25 to 10.50

Coke.—No large inquiries for blast furnace or foundry coke are in the market. We note a sale of about 25 cars of high grade 72-hour foundry coke for shipment over the next three months at $2.25 per net ton at oven. The output in the Upper and Lower Connellsville regions last week was about 295,000 tons, a slight increase over the previous week. We quote standard makes of furnace coke for spot shipment at $1.40 to $1.50 per net ton at oven, while for delivery over first half of 1911 from $1.75 to $2 is quoted. Best makes of 72-hour foundry coke for spot shipment are held at $1.90 to $2 per net ton at oven, and for first half of the year at $2.25 to $2.50.

Chicago

FISHER BUILDING, January 4, 1911.—(*By Telegraph.*)

The question of prices is now foremost in the minds of buyers as well as sellers of steel products in this territory. The leading buyers of bars are opposed to any reduction at the present time in their line, as their yearly contracts run from July to June. A reduction now would mean a heavy loss to them, as the price guarantee in their contracts does not apply to any tonnage already specified. In the case of structural material and plates the enormous amount of business in prospect is a sustaining factor. In view of these conditions the leading men in the Chicago market do not expect any reducement to a lower basis. Car inquiries are coming out a little better. The railroads are beginning quietly to place orders for track supplies for spring requirements and rail orders are ready to be placed with the mills from large Western roads. A curious movement in prices in this market may have some bearing on the immediate future of prices for finished materials. During the first half of 1910 there was a shortage of billets in this territory and none of the Chicago mills would authorize the quotation of a market price. During the last half of the year, billets were sold freely and open hearth forging billets went as low as $25, Chicago. The leading interest begins the year with a quotation of $31, Chicago, as the base price of forging billets, representing a sharp advance over prices quoted last month. This, in part, is due to a revision of extras on account of the large discard in making forging billets. Structural steel business in Chicago is still held in suspense, as the new building code has not yet become effective. Fabricators in this territory apparently feel assured of the future. There were only two bids on a 900-ton bridge which was advertised recently at Peoria, Ill. The authorities in charge returned these two bids unopened and will divide the work into separate contracts for the foundation and superstructure in the hope of obtaining more competitive bids.

Pig Iron.—Several fair inquiries were reported for Southern iron last week. One buyer inquired for 3000 tons, which is not reported closed, and two others inquired for 1000 tons each, which went at $11, Birmingham, for first half. There have been doubts whether the $11 price would hold, but these inquiries were of a character which gave the market a good test and did not develop any lower price on Alabama iron. A few lots of spot iron from Tennessee furnaces have been sold at slight concessions. On the whole, however, trading in pig iron amounts to a small tonnage for this market and not much business is expected until buyers begin to cover for second and third quarters. Stocks at Southern furnaces are estimated at 270,000 tons with a slight increase in the past two months. Authorities in this market do not confirm reports of lower prices on lake Superior charcoal, but Northern coke iron begins the year with a lower quotation of $15.50 to $16, Chicago, for No. 2 foundry and malleable Bessemer, or $15 at furnace for any round tonnage for first quarter or first half. The local furnaces, however, are obtaining higher prices for smaller lots. The necessity of using ore that is under contract has stood in the way of curtailment of production by local furnaces, and the melt of malleable Bessemer has been restricted by the lack of railroad orders in the malleable foundries. The following quotations are for January, February and March shipment, Chicago delivery.

Lake Superior charcoal	$18.00 to $18.50
Northern coke foundry, No. 1	16.00 to 16.50
Northern coke foundry, No. 2	15.50 to 16.00
Northern coke foundry, No. 3	15.25 to 15.75
Northern Scotch, No. 1	16.50 to 17.00
Southern coke, No. 1	15.85 to 16.35
Southern coke, No. 2	15.35 to 15.85
Southern coke, No. 3	15.10 to 15.60
Southern coke, No. 4	14.85 to 15.35
Southern coke, No. 1 soft	15.85 to 16.35
Southern coke, No. 2 soft	15.35 to 15.85
Southern gray forge	14.60 to 15.10
Southern mottled	14.60 to 15.10
Malleable Bessemer	15.50 to 16.00
Standard Bessemer	17.40 to 17.90
Jackson Co. and Kentucky silvery, 6%	18.40 to 18.90
Jackson Co. and Kentucky silvery, 8%	19.40 to 19.90
Jackson Co. and Kentucky silvery, 10%	20.40 to 20.90

(*By Mail.*)

Billets.—The leading interest has revised the price of forging billets in this territory and quotes $31, base, Chicago.

Rails and Track Supplies.—Western railroads have prepared specifications for a large tonnage of standard rails but are still holding back the placing of this business with the mills. Bookings last week were nominal, consisting of a few miscellaneous lots. The delay in placing contracts for track supplies may prove embarrassing to the railroads as

THE IRON AND METAL MARKETS

they may not be able to get necessary materials on the ground when their tracks thaw out in the spring. We quote standard railroad spikes at 1.65c. to 1.75c., base; track bolts with square nuts, 2.20c. to 2.30c., base, all in carload lots, Chicago. Light rails, 40 to 45 lb., 1.16c. to 1.20½c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12-lb., 1.25c. to 1.29½c., Chicago.

Structural Material.—The American Bridge Company has taken a contract amounting to 8000 tons from the Oregon Railway & Navigation Company for a bridge at Portland, Ore., over the Willamette River. This is a double deck bridge, with a lift span supported on towers. The American Bridge Company has also booked 600 tons of bridge work from the Northern Pacific. The Milwaukee Bridge Company has taken the Union avenue bridge at Pueblo, Colo., 400 tons. Important railroad work is expected to be let the coming week and hopes are entertained that this will open an active season for fabricating contracts. We quote plain material from mill, 1.58c. to 1.63c., Chicago; from store, 1.80c. to 1.90c., Chicago.

Plates.—Car builders are encouraged by recent inquiries which give a more favorable tone to the market for car material. The Pennsylvania Lines West are inquiring for about 1000 cars and the Pennsylvania Railroad Company for another 1000. There is also an unidentified inquiry in the market for 2000 cars. The plate mills have had less new business in recent months than any other finishing department, but the car business that is coming out will afford them good specifications. We quote prices at 1.58c. to 1.63c., Chicago; store prices, 1.80c. to 1.90c., Chicago.

Sheets.—New business during the holidays has been very light, and the mills do not expect much until later in the month. Prices are firm, considering the light volume of trade. We quote Chicago prices, carload lots, from mill: No. 28 black sheets, 2.38c.; No. 28 galvanized, 3.38c.; No. 10 blue annealed, 1.83c. Prices from store, Chicago, are: No. 10, 2.10c. to 2.20c.; No. 12, 2.15c. to 2.25c.; No. 28 black, 2.75c. to 2.85c.; No. 28 galvanized, 3.65c. to 3.75c.

Bars.—The largest buyers of soft steel bars in the West are very frank in expressing the hope that prices will not be reduced. They are all covered by yearly contracts which run to June 30. Most of them are in lines of business in which they make up large stocks during the winter for their spring trade, and a reduction in steel prices would have a depressing effect on the values of their finished stocks that would far outweigh any advantage to be gained now by lower prices. A few months later, when annual contracts come up for renewal, these large buyers of bars will be very keen to secure lower prices, but at present all their influence is exerted to sustain the market. Bar iron continues weak, although railroad buying is increasing. The price of 1.30c., Chicago, is only made on desirable lots for prompt shipment, and the mills are reluctant to quote on any inquiries for deferred specifications. The market for hard steel bars is very quiet. We quote as follows: Soft steel bars, 1.58c.; bar iron, 1.30c. to 1.35c.; hard steel bars rolled from old rails, 1.40c. to 1.45c., all Chicago. From store, soft steel bars, 1.80c. to 1.90c.

Wire Products.—The financial market editors have not troubled the wire business with talk of lower prices. The wire mills are doing very well on new business and prices are firmer than they were last fall. While many jobbers and dealers are holding back specifications, the condition of the hardware trade is so favorable that a normal demand is expected for all jobbing wire products. The fence fabricators expect the usual growth this spring in the demand for woven fence. Jobbers' carload prices, which are quoted to manufacturing buyers, are as follows: Plain wire, No. 9 and coarser, base, 1.68c.; wire nails, 1.88c.; painted barb wire, 1.88c.; galvanized, 2.18c., all Chicago.

Merchant Steel.—Specifications were very satisfactory during December. Merchant steel seems to be immune from the depressing influences that have worked their will with other finished products. The falling off in specifications from the automobile trade has been made up by an increase in the demand for agricultural steel.

Cast Iron Pipe.—Western cities have been somewhat slow in making up their specifications for water pipe, as this business is easily controlled by the banking interests, since it depends on the sale of bonds. The foundries, however, expect to book a large tonnage before spring, although prices are low and unsatisfactory. On current business we quote, per net ton, Chicago, as follows: Water pipe, 4-in. $25; 6 to 12 in., $24; 16-in. and up, $23.50, with $1 extra for gas pipe.

Old Material.—The holiday stagnation has forced scrap prices to a lower level than was quoted at any time last year. The general level of the market is almost as low as during the first half of 1908, and the low points touched in the spring of 1909. Mills, foundries and practically all other consumers are carrying good stocks and dealers can only place the broken lots they have in transit by making concessions. Railroad malleable scrap and short rails used by malleable foundries have declined less than other lines in the liquidation in the past two months. The spot price of heavy melting steel varies from $11.50 to $12 delivered, according to grades. Carefully graded stock will bring $12, but mills which are not so particular regarding specifications only offer $11.50. Cast scrap has declined $1 in two months. Rerolling rails were sold by railroads for $16 in October, but are now purchased by the mills from dealers as low as $13.50. Decreased consumption has been the principal factor in this depression. The prices quoted below are for delivery to buyers' works, all freight and switching charges paid. Sellers of scrap usually receive 50c. to $1 less in this district, owing to high switching charges. Following prices are per gross ton, delivered, Chicago:

Old iron rails	$15.50 to $16.00
Old steel rails, rerolling	13.50 to 14.00
Old steel rails, less than 3 ft	13.00 to 13.50
Relaying rails, standard sections, subject to inspection	23.00 to 24.00
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	11.50 to 12.00
Frogs, switches and guards, cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50

The following quotations are per net ton:

Iron angles and splice bars	$13.00 to $13.50
Iron car axles	18.50 to 19.00
Steel car axles	17.75 to 18.25
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Steel knuckles and couplers	11.25 to 11.75
Locomotive tires, smooth	17.00 to 17.50
Steel axle turnings	7.75 to 8.25
Machine shop turnings	6.50 to 7.00
Cast and mixed borings	5.00 to 5.50
No. 1 busheling	9.50 to 10.00
No. 2 busheling	7.25 to 7.75
No. 1 boilers, cut to sheets and rings	8.50 to 9.00
Boiler punchings	13.00 to 13.50
No. 1 cast scrap	12.00 to 12.50
Stove plate and light cast scrap	10.25 to 10.75
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.50 to 11.00
Pipes and flues	8.75 to 9.25
Iron arch bars and transoms	14.00 to 14.50
Steel angle bars	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, January 4, 1911.—(*By Telegraph.*)

Pig Iron.—A few fair-sized inquiries have come out during the holiday season. A central Ohio melter is asking for 1000 to 1500 tons of No. 2 Northern foundry, and a Missouri stove maker wants about 2000 tons of Southern foundry, both for first half shipment. The past week's sales include two lots of No. 2 Southern foundry for first half shipment, booked at $11, Birmingham. One of these was for 1200 tons for a Northwestern consumer, and the other called for 1000 tons for an Indiana manufacturer. A few small orders for foundry and one for gray forge were also booked, practically all for spot shipment. It is predicted that the next 30 days will show a shifting to activity among the foundries. Several that have been busy lately are now experiencing a dull period, while others who have been almost idle are reported to have secured contracts that will keep them operating for some time ahead. All sales agencies state that foundry stocks are much lower now than on January 1 of last year, but the difference is not enough to offset the increased tonnage piled on furnace yards. The settlement made with the local Iron Molders' Union last week provided for an increase of 5 per cent. in wages and averts a strike that was to have been called this week, which would probably have inconvenienced the stove manufacturers in this section more than any other class of foundries. Prices remain at $11, Birmingham, and $14, Ironton, for Southern and Northern No. 2 foundry for first quarter delivery, and quite a number of producers are willing to take on first half business at these figures. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows, for first quarter:

Southern coke, No. 1 foundry	$14.75 to $15.25
Southern coke, No. 2 foundry	14.25 to 14.75
Southern coke, No. 3 foundry	13.75 to 14.25
Southern coke, No. 4 foundry	13.50 to 14.00
Southern coke, No. 1 soft	14.75 to 15.25
Southern coke, No. 2 soft	14.25 to 14.75
Southern gray forge	13.00 to 13.50
Ohio silvery, 8 per cent. silicon	18.20 to 18.70
Lake Superior coke, No. 1	15.70 to 16.20
Lake Superior coke, No. 2	15.20 to 15.70
Lake Superior coke, No. 3	14.70 to 15.20
Standard Southern car wheel	25.25 to 25.75
Lake Superior car wheel	19.50 to 20.50

(*By Mail.*)

Coke.—It is known that quite a number of foundry contracts are expiring, but the foundries are extremely slow in making new contracts just now and most of them are buy-

THE IRON AND METAL MARKETS

ing just enough to carry on their work. Prices remain unchanged in all fields and the premium for spot furnace in the Wise County district, previously reported, is not now being obtained. Furnace coke from Connellsville, Wise County and Pocahontas ovens is quoted around $1.45 to $1.55 for immediate shipment and at $1.65 to $1.85 on contracts. Foundry coke is still available at $2 for spot shipment and around $2.25 on contracts in all three fields. These prices are per net ton at oven.

Finished Material.—The holiday season has cut in this branch of business and there is very little doing in any line, although inquiries are coming in and the outlook for this year is very good. Buyers seem disposed to wait on the result of the proposed manufacturers' conference in New York January 11. Warehouse prices on structural material remain around 1.75c. to 1.85c. Some small hoop and band business was booked last week.

Old Material.—The situation has not improved and local scrap dealers do not anticipate any change until there is an advance in pig iron. It is rumored that some dealers are shading prices, but this action does not seem to have brought them any business. Prices for delivery in dealers' yards, southern Ohio and Cincinnati, are as follows:

No. 1 railroad wrought, net ton	$12.00 to $12.50
Cast borings, net ton	4.50 to 5.00
Steel turnings, net ton	6.00 to 6.50
No. 1 cast scrap, net ton	11.00 to 12.00
Burnt scrap, net ton	8.00 to 9.00
Old iron axles, net ton	17.50 to 18.50
Old iron rails, gross ton	14.50 to 15.50
Relaying rails, 50 lb. and up, gross ton	22.50 to 23.50
Old car wheels, gross ton	12.00 to 13.00
Heavy melting steel scrap, gross ton	12.00 to 12.50

Philadelphia

PHILADELPHIA, PA., January 3, 1911.

While some good business is pending in pig iron, sales have been confined mostly to small lots. Little new business has come out in finished materials, buyers awaiting further developments. No price concessions are heard of in this district. There has been little movement in old material. Moderate coke transactions are reported, principally for spot shipment, for which prices are easier.

Iron Ore.—Importations at this port during 1910 aggregated 1,165,961 tons, valued at $3,416,199, exceeding all previous records. One cargo of low phosphorus ore has been recently taken by a producer in this district, who is understood to be in the market for a further quantity. Generally speaking, however, the market is extremely dull.

Pig Iron.—Transactions have been on a rather small scale. The inquiry reported last week from the Pennsylvania Railroad is still unclosed, although expected to be placed before the week end. The only other large inquiries are from the cast iron pipe foundries, one being in the market for 10,000 tons, while another would take a somewhat smaller amount. Producers, however, are disinclined to take orders for large blocks of iron for forward delivery at the ruling level, although perfectly satisfied to accept orders at current prices for shipment during the next 30 or 60 days. Further curtailment of pig iron production is being considered. One Alburtis stack of the Thomas Iron Company was blown out during the week. According to statistics of the Eastern Pig Iron Association, which held its regular monthly meeting last week, stocks on hand at the close of the year were double the amount at the beginning of the year, representing, however, but a trifle less than two weeks' output of the entire capacity of the furnaces represented by the membership of the association. Sales of both eastern Pennsylvania and Virginia foundry irons have been light. There has been no movement reported in forge iron. Little demand for steel making grades has come out. The same interest which has recently been in the market for basic, at a price, would buy if its views were met, but producers will make no concessions from $14.75, delivered, for forward shipment, although a moderate lot of prompt basic might be had at a slightly lower figure. Several sales of small lots of low phosphorus iron are reported at the market. The following range of prices is named for standard brands, delivered in buyers' yards in this vicinity, during the first quarter and in instances the first half of the year:

Eastern Pennsylvania, No. 2 X foundry	$15.50 to $15.75
Eastern Pennsylvania, No. 2 plain	15.00 to 15.25
Virginia, No. 2 X foundry	15.80 to 16.00
Virginia, No. 2 plain	15.80 to 16.00
Forge	14.25 to 14.50
Basic	14.75
Standard low phosphorus	22.00 to 22.50

Ferroalloys.—Consumers of ferromanganese in this territory show practically no interest in the market. Prices for 80 per cent. are nominally quoted at $38.25 to $38.50, Baltimore, according to delivery. A sharper demand for 50 per cent. ferrosilicon is reported, both in small prompt lots and moderate quantities for extended shipment. For prompt shipment it commands $56, Philadelphia, while for forward delivery $55 or less might be done.

Billets.—Little new business comes out except in small lots for prompt shipment. Prices are unchanged, not enough business developing to test the market. Basic open hearth rolling billets are quoted at $25.40, delivered in this district, with ordinary forging billets at $28, Eastern mill. By a transposition in the type last week an error was made in quoting rolling billets at $24.50, the correct price having been $25.40.

Plates.—Few inquiries of any size are reported, consumers coming into the market, as a rule, for small immediate requirements. Mills in this territory report prices for ordinary plates as being firmly maintained at 1.55c., delivered in this vicinity.

Structural Material.—The current demand is small. Several propositions of moderate size are under negotiation, but show no haste in closing. Quotations of Eastern makers are unchanged, the 1.55c. minimum for plain shapes delivered in this territory being maintained.

Sheets.—Mills in this vicinity have, for the most part, resumed operations on orders accumulated during the holiday suspension, but will have to depend largely on a continued demand, as order books are not in very good shape. Eastern mills hold prices firmly, the following range being quoted for early shipment: Nos. 18 to 20, 2.50c.; Nos. 22 to 24, 2.60c.; Nos. 25 and 26, 2.70c.; No. 27, 2.80c.; No. 28, 2.90c.

Bars.—Business has been light and the market shows little indication of immediate betterment. Prices of either refined iron or steel bars show little change, the former being quoted at 1.32½c. to 1.42½c., and the latter 1.55c., delivered in this vicinity.

Coke.—Recent purchases have been principally confined to prompt lots. Several moderate quantities of furnace coke for January delivery have been taken by Eastern furnaces at $1.45, at oven, although forward coke is held at $1.50 to $1.65. Prompt foundry coke is easy at $2, at oven, while $2.20 to $2.35 is quoted for forward shipment. The following range of prices per net ton, delivered in buyers' yards in this district, extending over the first half of the year, is named:

Connellsville furnace coke	$3.75 to $3.90
Foundry coke	4.20 to 4.40
Mountain furnace coke	3.35 to 3.50
Foundry coke	3.85 to 4.05

Old Material.—The market has been practically at a standstill. Occasional carload and smaller lots have been sold, usually material that had to be moved, and in many grades not enough business has been done to establish a market. Quotations therefore are to a large extent nominal. The following range, however, about represents sellers' ideas of the market for deliveries in buyers' yards, eastern Pennsylvania and nearby points, carrying a freight rate from Philadelphia ranging from 45c. to $1.35 per gross ton:

No. 1 steel scrap and crops	$12.50 to $13.00
Old steel rails, rerolling	15.50 to 16.00
Low phosphorus	18.00 to 18.50
Old steel axles	19.50 to 20.00*
Old iron axles	26.00 to 27.00*
Old iron rails	17.00 to 17.50*
Old car wheels	13.00 to 13.50
No. 1 railroad wrought	15.75 to 16.25
Wrought iron pipe	12.25 to 12.75
No. 1 forge fire	11.00 to 11.50
No. 2 light iron	7.00 to 7.50
Wrought turnings	8.00 to 8.50
Cast borings	8.00 to 8.50
Machinery cast	14.00 to 14.50
Railroad malleable	13.00 to 13.50
Grate bars	11.00 to 11.50
Stove plate	10.00 to 10.50

* Nominal.

Birmingham

BIRMINGHAM, ALA., January 2, 1911.

Pig Iron.—The business transacted in this market the past week was not of sufficient volume to indicate definitely any change in the attitude of any parties concerned. Report was made only of the sale of carloads to lots of 100 tons for prompt shipment, with the aggregate engaged very limited. A schedule of prices based on $11, Birmingham, is being adhered to for prompt shipments or deliveries during the first quarter, with an advance of 50c. per ton over that basis generally asked for second quarter shipments. It has been rumored that certain of the leading producers have revised quotations to a basis of $11 for deliveries to cover the entire first half, but such reports cannot be confirmed through the regular sources. It is not improbable, however, that round tonnage offers at such figures would be accepted by the majority of producing interests. The reports concerning a concession from $11 in a strictly cash transaction for

THE IRON AND METAL MARKETS

prompt or comparatively early deliveries are given credence, with the tonnage available under those conditions understood to be in the hands of one interest only. At this time no figures are available to show the aggregate of stocks on hand as of January 1, and by reason of the changes in operations during December an estimate cannot be arrived at with accuracy. It is understood that an additional furnace, not heretofore mentioned, is to be blown out at an early date, with only 12 stacks in the Birmingham district proper now being operated on foundry iron. The operations on basic iron have been reduced to two stacks in this district. The resumption of operations at foundries closed for the holidays has been quite equal to expections so far and a very heavy movement from furnace yards is already under way.

Cast Iron Pipe.—No announcement has yet been made as to the dates for lettings of tonnage now considered in sight and because of the season the requirements for maintenance work are very light. The producing interests have been chiefly interested the past week in the taking of inventories, &c., and little interest in market conditions has been manifested. From the data so far in hand it is judged that the aggregate of stocks on hand January 1 will be considerably larger than that shown for January 1, 1910, although the outlook is considered more favorable than at this time one year ago. Without evidence to the contrary, we quote nominal prices as unchanged, as follows per net ton, f.o.b. cars here: 4 to 6 in., $19 to $19.50; 8 to 12 in., $18 to $18.50; over 12-in., average $17, with the usual $1 per ton extra for gas pipe.

Old Material.—This market does not show signs of an improvement, with all parties concerned apparently content to await further developments. The transactions reported for the past week consisted of the sale of a lot of 250 tons of light cast to a manufacturer of agricultural implements and 25 tons of stove plate to a local foundry. A local mill is understood to be in the market for 250 tons of wrought scrap, but the price offered is not considered satisfactory. We quote dealers' asking prices as follows per gross ton, f.o.b. cars here:

Old iron axles	$14.00 to $14.50
Old iron rails	12.00 to 12.50
Old steel axles	14.00 to 14.50
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	9.00 to 9.50
No. 1 country	7.50 to 8.00
No. 2 country	7.00 to 7.50
No. 1 machinery	9.50 to 10.00
No. 1 steel	10.00 to 10.50
Tram car wheels	9.00 to 9.50
Standard car wheels	10.00 to 10.50
Light cast and stove plate	7.50 to 8.00

Cleveland

CLEVELAND, OHIO, January 3, 1911.

Iron Ore.—The movement in favor of the maintenance of 1910 prices on Lake Superior ores during 1911, which appears to have originated among Eastern consumers, is meeting with a great deal of approval from furnace companies in the Central West. In fact, it can be quite safely said that the only advocates of lower prices on ores among the consumers are those interests, few in number, that did not over buy last year, and consequently will have only a small tonnage of ore on hand at the opening of navigation May 1. A reduction in prices would work to the advantage of such consumers as compared with furnace companies that will have enough 1910 ore to last them through the greater part of the present year. It is estimated that there will be enough 1910 ore left over after May 1 to fill 40 per cent. of the requirements of the consumers for the season of 1911, and furnacemen see an immense loss in value of their stocks should a price reduction of even 50 cents a ton be made. Some of the furnacemen believe not only that last year's prices should be maintained, but that the ore firms should get toegther at once and fix prices at last year's basis. Such action, it is claimed, would not only dispose of the uncertainty about prices, but would also tend to strengthen the pig iron market. Ore firms, however, show no disposition to change their policy of refraining from taking action on prices until consumers get ready to buy, which is not expected to be for the next two or three months, at least. One statement regarding the 1911 prices can be made quite positively, and that is that whenever the ore companies decide to fix the prices they will be firmly maintained throughout the season. In other words, what is regarded as a mistake made in 1907, when it was announced late in the year that the price of that year would be maintained the following year, but a decline of 50 cents a ton became effective when actual buying started the next spring, will not be repeated. In spite of a published denial, the report that was made in *The Iron Age* of December 22, that some reservation of 1911 ore had been made, was correct, such reservations coming from independent concerns having no affiliation with ore companies. We quote prices as follows: Old Range Bessemer, $5; Mesaba Bessemer, $4.75; Old Range non-Bessemer, $4.20; Mesaba non-Bessemer, $4.

Pig Iron.—Only a few sales of small lots are reported. New inquiries, also, are scarce and for small tonnages. Some inquiries that came out during December are still pending, purchasing having been deferred until after the first of the year, and these are expected to result in the placing of some business during the next two weeks. The foundry trade is not active and it is believed that many consumers who have not already bought for their first quarter or first half requirements will wait until they see how business is going to start up in the new year before coming into the market. Local furnaces are adhering to $14, at furnace, for local delivery, but this price is being shaded for outside shipment. Shipments from furnaces are still somewhat light owing to hold-up orders during inventory taking. For prompt shipment and the first half we quote, delivered Cleveland, as follows:

Bessemer	$15.90
Northern foundry, No. 1	14.50
Northern foundry, No. 2	14.25
Northern foundry, No. 3	14.00
Gray forge	13.90
Southern foundry, No. 2	15.35
Jackson Co. silvery, 8 per cent. silicon	19.00

Coke.—No local inquiries for furnace coke are pending, and consumers of foundry grades are nearly all under contract for the first half. Prices remain about stationary. We quote standard furnace coke at $1.45 to $1.50 per net ton, at oven, for spot shipment, and $1.75 to $1.85 for the first half. Best grades of Connellsville 72-hour foundry coke are held at $2 for spot shipment and $2.25 to $2.50 for the first half.

Finished Iron and Steel.—While some of the selling agencies report about as good a volume of orders as during the few preceding weeks, consumers generally are holding off as much as possible, and about all of the new orders and specifications are for immediate requirements. With the possibility of lower prices, only a limited amount of business is looked for until after the conference of steel manufacturers in New York January 11. Selling agencies are firmly maintaining prices on steel bars, structural material and plates. The demand for sheets is so light that prices have not been tested in this market recently and regular quotations are being generally adhered to. Some new structural work is being figured on and reports indicate that some fabricators are quoting very low prices. A large amount of structural work is in prospect in this vicinity, a considerable portion of which will probably be contracted for before spring. Bids have been received for an addition to the Y. M. C. A. building and for the Peninsular Savings Bank building in Detroit, each requiring about 400 tons. Contracts are expected shortly from Ohio fabricators for about 2000 tons for bridge work. The Detroit & Cleveland Navigation Company will be built this year and completed in time for operation at the opening of the 1912 season. The demand for iron bars continues light, but local mills are getting enough orders to keep them running at somewhat over half their full capacity. We quote iron bars at 1.30c. to 1.35c., at mill.

Old Material.—The market continues dull and prices generally are weak. Owing to the absence of sales during the past two or three weeks, quotations on a number of grades are only nominal. Dealers claim that Canton and Sharon mills refuse to pay over $13.50 for heavy melting steel, and a reduction of 25 cents a ton on this grade is noted. It is expected that the embargo on scrap that has been in force by the Otis Steel Company for the past month will be lifted this week. Railroad lists this week include the Pennsylvania Lines, and the Erie to close January 5, and the Wheeling & Lake Erie on which bids were received January 3. Dealers' prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails	$13.75 to $14.25
Old iron rails	15.50 to 16.00
Steel car axles	19.50 to 20.00
Heavy melting steel	12.50 to 12.75
Old car wheels	12.00 to 12.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	11.75 to 12.00
Railroad malleable	13.00 to 13.50
Light bundled sheet scrap	9.00 to 9.50

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$21.00 to $21.50
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	6.50 to 7.00
Steel axle turnings	8.75 to 9.00
No. 1 busheling	11.00 to 11.50
No. 1 railroad wrought	12.50 to 13.00
No. 1 cast	11.50 to 12.00
Stove plate	10.00 to 10.50
Bundled tin scrap	11.00 to 11.50

THE IRON AND METAL MARKETS

San Francisco

SAN FRANCISCO, December 28, 1910.

The attention of merchants and manufacturers is occupied at present with stock-taking. A fair tonnage was booked in some departments during the week before Christmas, but in general the market was quiet throughout December. The outlook for 1911 is felt to be rather uncertain, and buying is likely to continue on a conservative scale for at least a month or two. Some anxiety is felt over the absence of rain in California, and buyers are also inclined to hold off until they feel more definitely assured as to the tendency of prices. There are many favorable features, however, as supplies on this coast have been greatly reduced in the last few months, while conditions in the oil, mining and other large industries are better than for some time. Municipal improvements are planned on a large scale by most cities, and there are prospects of some increase over 1910 in building.

Bars.—The movement throughout the year has been somewhat below expectations, yet preparations for stock-taking show that supplies in the hands of merchants are not burdensome. One firm, which has received considerable foreign material recently, has about the only large stock carried here. There is little demand, and while some business of a sorting-up nature is expected after the first of the year, buyers are disposed to hold off from the market for a month or two. By that time it is believed that the Western Steel Corporation, Seattle, will be able to ship all sizes of bars. The outlook for soft steel appears a little uncertain for the early part of the year, but reinforcing material should be in good demand. Local merchants have again reduced their prices and now quote bars from store, San Francisco, at 2.10c. for iron, and 2.30c. for steel.

Structural Material.—Fabricators are disappointed at the tonnage booked in December for work in San Francisco and vicinity, as the letting of large contracts has been greatly delayed, and it is unlikely that anything of any moment will come out until next week. The bid on the Lowell High School was rejected, and some changes will be made in the plan, and the Masonic Temple contract is being held over from week to week. The general contract has been let on a court house at Sacramento, Cal., but the steel work has not been awarded. Excavation plans have arrived for the Oakland city hall, and an inquiry for the steel is expected within a few weeks. The situation has also been rather quiet at other coast points, but there will be considerable figuring at Los Angeles next month. A number of new plans are announced for San Francisco and Oakland, but little of the work is actually in sight. The contract on Hale Bros.' department store, however, is fairly certain to be let shortly. Plans have been filed for a large building for Lipman, Wolfe & Co.'s department store at Portland, Ore. Arrangements are being made for the erection of the new Tivoli Theatre in San Francisco. A site has been purchased for a large armory for the National Guard of California, and the building will probably be erected in 1911. Plans have been accepted for a large eight story building for the German societies of San Francisco. The Guaranty Trust & Savings Bank of Sacramento will let contracts next spring for a $125,000 building. A large bridge is to be erected shortly at Tacoma, Wash. Beams and channels, 3 to 15 in., from store, San Francisco, are quoted at 2.60c.

Rails.—The movement has been fairly well sustained for the year-end period, though no especially large business has been transacted in the last few weeks. A few of the smaller roads in this district are taking figures on their prospective requirements, and a few substantial orders are expected during the first quarter, though the principal tonnage, aside from the material used by the transcontinental lines, will be required in small lots for logging and other short lines. There is a possibility, however, that business may materialize shortly on some of the projected interurban lines in central California. Plans are being made for a three-mile railway along the ocean beach in San Francisco. Following a change in control, considerable development work is expected on the lines of the Oakland Traction Company and the Key Route in Oakland. The Southern Pacific is now actively at work an the survey of a new line over Tehachapi Pass, and is also surveying for a number of branches in northern California, to tap numerous mines, quarries and timber districts.

Plates and Sheets.—There is a renewal of inquiry for tank plates, sheet pipe, &c., for oil and gas interests. The Independent Oil Producers' Agency is making arrangements for a large increase of storage capacity on the part of its members, and one of the largest oil interests has made financial arrangements which will enable it to proceed on a large scale with projected storage and pipe line projects. A number of the gas companies in southern California have been consolidated, and are preparing to add materially to the capacity of their plants. R. D. Wood & Co. have taken a contract to erect a gas holder of 6,000,000 cu. ft. capacity for the Los Angeles Gas & Electric Company. The city of Walla Walla, Wash., has taken bids on 6000 ft. of 20-in., 14-gauge sheet steel pipe.

Merchant Pipe.—The recent movement in northern and central California has been entirely of a distributive nature, and there is little demand at the moment. Most of the jobbers have reduced their stocks, however, and a general sorting-up movement is expected during the next month, though dealers are not disposed to buy on a very large scale. Increasing inquiries are coming from southern California and the oil fields, and some large orders both for casing and line pipe are expected. The production of oil is still curtailed and will be until greater storage and transportation facilities can be provided, though new development work is more active than for some time. The absence of rain has made delivery to the oil fields possible at a much later date than usual.

Cast Iron Pipe.—According to plans now being formed by southern California interests, a heavy tonnage of gas pipe will be required during the year. The city of Los Angeles is working on plans for a high pressure system, similar to that being installed in San Francisco, but will not be ready to place its order for some time. Several northern gas plants have been acquired by the Byllesby interests of Chicago, and preliminary arrangements are being made for many extensions. The town of Vallejo, Cal., will shortly be in the market for 1120 lengths of 12-in. and 340 lengths of 8-in. pipe. The city of Portland, Ore., will receive bids January 10 for about 5792 tons of pipe, of which 1383 tons will be 30-in., 745 tons 16-in., and 485 tons 12-in. Fifty tons of specials will also be required.

Pig Iron.—The local market on foundry pig iron has been without feature, as current requirements are small and melters show no inclination to buy anything until some time in January. As far as can be learned, no business has yet resulted from the recent inquiry for basic iron. Prices are entirely nominal and unchanged.

Old Material.—No large transactions have been closed recently, and steel melting scrap is the only line which receives much attention. A number of good inquiries for this material have come up, and some large contracts for delivery through the year are expected early in January. The price is nominally as before, $12.50 per gross ton, but there is a very firm undertone to the market. Cast scrap is quiet, but firmly held at $18 per net ton. Wrought scrap is quoted at $13.50 and rerolling rails at $15, both per net ton.

The Union Iron Works Company, San Francisco, will move its downtown offices January 1 from 320 Market street to the Insurance Building, California and Battery streets.

St. Louis

ST. LOUIS, MO., January 2, 1911.

In common with other centers, the attention of St. Louis manufacturers, wholesale merchants and brokers has mainly been engrossed with inventories and accounts, and but little new business in any line was booked the past week. The receipts of pig iron at St. Louis for the year 1910 were 321,070 tons; of coke, 191,190 tons, as shown by railroad statistics.

Pig Iron.—Not much in the way of new business was expected of the closing week of the year and but one house had anything to report. Specifications on contracts have come along quite freely and we hear of no requests to hold shipments, whereas at the corresponding time a year ago there were quite a number of such requests, owing to overbuying. There has been considerable hand-to-mouth buying during the past two or three months, and sellers predict upon this, together with free shipment on contracts, that an improvement in the demand can reasonably be expected early in the present month. Some of the leading houses are inclined to feel firmer in their views from the tenor of advices from the furnaces which they represent. On the other hand, merchant sellers believe that the spread between spot shipment and first half contract iron will increase in order to induce buyers to take that delivery. We continue our quotations for Southern No. 2 foundry, for shipment over the first half, at $11, Birmingham, though $11.25 is asked by some sellers for second quarter delivery, and concessions are reported for spot shipment.

Coke.—A leading seller reports inquiries from four or five large consumers aggregating 150 cars of Connellsville foundry coke, which likely will be closed during the next 10 days. There is no complaint of shortage of cars, and contract specifications are being furnished satisfactorily. We

THE IRON AND METAL MARKETS

quote standard 72 hr., Connellsville foundry, at $2 to $2.25 per net ton, f.o.b. oven, according to quantity and delivery.

Old Material.—Owing to the weakness of the market through lack of demand, cancellations of contracts failing of shipment according to agreement are being experienced. There are no features of interest to report other than the two small offerings by local railroads as follows: Missouri-Pacific, 500 tons; St. Louis & San Francisco, 250 tons, miscellaneous scrap. We quote dealers' prices, per gross ton, f.o.b. St. Louis:

Old iron rails	$12.00 to $12.50
Old steel rails, rerolling	12.00 to 12.50
Old steel rails, less than 3 ft	12.00 to 12.50
Relaying rails, standard sections, subject to inspection	24.00 to 24.50
Old car wheels	12.50 to 13.00
Heavy melting steel scrap	11.50 to 12.00
Frogs, switches and guards, cut apart	11.50 to 12.00

The following quotations are per net ton:

Iron fish plates	$11.00 to $11.50
Iron car axles	18.00 to 18.50
Steel car axles	17.00 to 17.50
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Railway springs	10.00 to 10.50
Locomotive tires, smooth	15.50 to 16.00
No. 1 dealers' forge	9.00 to 9.50
Mixed borings	4.50 to 5.00
No. 1 busheling	10.00 to 10.50
No. 1 boilers, cut to sheets and rings	8.50 to 9.00
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.00 to 9.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	8.00 to 8.50
Pipes and flues	8.50 to 9.00
Railroad sheet and tank scrap	8.50 to 9.00
Railroad grate bars	8.00 to 8.50
Machine shop turnings	7.00 to 7.50

The St. Louis Terminal Electric Railway has increased its capital stock from $1,000,000 to $2,000,000. The extra capital is required in the construction of six miles of trackage to Venice and Granite City, Ill. This is the McKinley system, which is incorporated in Missouri for the development of its plans on this side of the river. Bonds will be issued to cover the additional requirements on both sides.

Buffalo

BUFFALO, N. Y., January 3, 1911.

Pig Iron.—Passive conditions continue to prevail, with little interest manifested by buyers and deliveries on contracts still held up on account of inventories. It is stated that the market has been cleared of the resale malleable which was offered recently, the last of it having been taken by a malleable iron castings concern in Buffalo territory, and no malleable is now being offered here at under $14.50. The aggregate of inquiry for all grades for the week between the two holidays did not total more than 5000 tons, and the only sales made were in carload to 100-ton lots. So little business was done that it is difficult to fix a definite schedule of prices; but the figures given below closely approximate the market for first quarter and half delivery, f.o.b. Buffalo:

No. 1 X foundry	$14.50 to $15.00
No. 2 X foundry	14.25 to 14.75
No. 2 plain	14.25 to 14.50
No. 3 foundry	14.00 to 14.25
Gray forge	14.00 to 14.25
Malleable	14.50 to 15.00
Basic	14.50 to 15.00
Charcoal	17.50 to 18.25

Finished Iron and Steel.—Most mills and agencies report current business as of small volume, with light inquiry in all lines, with the exception of structural material, in which there is some demand. There is also some inquiry for reinforcing bars for concrete construction. In general lines all orders that can be held off by purchasers are kept back awaiting definite developments in the price situation, and no one seems willing to close contracts at the present time, although many buyers are anxious to have the price basis determined speedily so that business can be proceeded with. The agency of the leading interest reports the latest mails are bringing increased inquiry, showing a little more encouraging outlook. The same agency also states the aggregate sales of the office for 1910 were the largest of any year in its history. Canadian buyers, although purchasing more freely than the domestic trade, are now to some extent holding off to see what price conditions develop in the United States. In structural lines quite an amount of new business is developing. Plans are on the boards, and figures will soon be received for a 14-story office building to be erected here for the Buffalo General Electric Company, calling for a good sized tonnage of steel. Plans are also being prepared for a 9-story office building for the New York Telephone Company in this city. An agreement has been signed by the Buffalo Grade Crossings Commission and the Erie Railroad for elimination of grade crossings in the northern section of the city, taking about 2000 tons of structural steel, besides large quantities of concrete reinforcing material. In Toronto the citizens are voting this week on the proposition to construct a steel viaduct across Rosedale Ravine, for which a large tonnage of structural material will be required. Bids are soon to be received for steel for Jenss Brothers' store and office building, Lockport, N. Y., for which a small tonnage will be required, and a steel frame church at Syracuse. The Rochester Structural Steel Company has received contract for steel for R. T. French & Co.'s warehouse, Rochester, 180 tons, and the Seneca Engineering Company for a small tonnage for the Sigma Nu Fraternity Building, Cornell University, Ithaca.

Old Material.—The market is absolutely stagnant, practically no demand having developed in any line during the week, and only a limited delivery being accepted on contracts. Prices are unchanged and almost entirely nominal. We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel	$11.75 to $12.25
Low phosphorus steel	17.00 to 17.50
No. 1 railroad wrought	15.00 to 15.50
No. 1 railroad and machinery cast scrap	13.75 to 14.25
Old steel axles	18.50 to 19.00
Old iron axles	23.00 to 23.50
Old car wheels	14.00 to 14.50
Railroad malleable	13.00 to 13.25
Boiler plate	9.75 to 10.25
Locomotive grate bars	10.50 to 11.00
Pipe	9.75 to 10.00
Wrought iron and soft steel turnings	7.00 to 7.50
Clean cast borings	6.50 to 6.75

New York

NEW YORK, January 4, 1911.

Pig Iron.—Occasionally an important buyer asks for a price, but the attitude of most large consumers is one of great caution. It is admitted that prices are low and that some furnaces are at their cost line or below, but the stability of the price structure as affected by raw material costs for next year is a factor to which many are giving consideration. Small foundries as a rule have all the iron they need, and some of them are noticing rather more shrinkage in their own business. Two cast iron pipe companies are reported in the market for a total of 16,000 tons. We quote for tidewater delivery as follows: Northern No. 1 foundry, $15.50 to $15.75; No. 2 X, $15 to $15.25; No. 2 plain, $14.50 to $14.75; Southern No. 1 foundry, $15.50 to $15.75; No. 2, $15.25 to $15.50.

Finished Iron and Steel.—There has been practically no change in the situation in the last two weeks. All lines are especially quiet during the closing of the year's business. Buyers have taken only what was absolutely needed to replenish stocks, and the placing of new business has been deferred on the possibility that the new year might bring lower prices. Thus far no changes have been made and there is little to indicate that any will be made; however, within the next two weeks a decision will probably be reached. At present prices in this territory are claimed to be firmly maintained. The returns for the year 1910 are not all in, but they will unquestionably show a falling off as compared with 1909, due principally to the decline in the latter half of the past year. Some manufacturers in certain lines may show a slightly increased tonnage for the year, but the lower average price at which it was sold will still bring the year's total receipts below those of 1909. Regardless of whether or not the near future will bring a readjustment of prices, the feeling is quite general that little improvement is to be looked for before February 1, and perhaps not then. It is hoped that railroad rate matters will be satisfactorily disposed of shortly and that more extended buying on the part of the railroads will result. They have not been very prominent in the market for some time and it is felt that they have need for considerable material. The New York Central has lately taken bids on several contracts, but no decisions have been reached on those most recently opened. Inquiry for an additional 1000 tons is now before the trade and bids will be received until January 9. About 600 tons of this material is to be used in a suburban station adjacent to the new terminal. The Boston & Maine also has an additional inquiry for about 600 tons of bridge material. The Quebec Bridge Commission has been unable to agree and the award is indefinitely postponed. A new board of experts is to be formed to pass upon the points under dispute, as important questions of design are involved. Payne Brothers were low bidders and it is reported have been awarded the Perth Amboy power house for the Public Service Electric Company. Between 800 and 1000 tons of steel will be required. Levering & Garrigues have the contract for the Sloane warehouse building at Fifth avenue and Forty-seventh street, which will require about 2500 tons. Whitworth was low bidder on the Appraiser's Store in Boston, but the price exceeds the appropriation and the building is

THE IRON AND METAL MARKETS

likely to be redesigned and the bids readvertised. Present price quotations are as follows: Plain structural material, plates and steel bars, 1.56c. to 1.61c., and bar iron, 1.45c. to 1.50c., all New York. Plain material from store, New York, 1.85c. to 1.95c.

Cast Iron Pipe.—Conditions in this branch of trade continue quiet. Carload lots of 6-in. are quoted nominally at $22 per net ton, tidewater.

Old Material.—Transactions are exceedingly light and the market is weak. Quotations per gross ton, New York and vicinity, are as follows:

Old girder and T rails for melting	$9.50 to $10.00
Heavy melting steel scrap	9.50 to 10.00
Relaying rails	20.50 to 21.50
Standard hammered iron car axles	20.50 to 21.00
Old steel car axles	15.00 to 15.50
No. 1 railroad wrought	11.75 to 12.25
Wrought iron track scrap	10.75 to 11.25
No. 1 yard wrought, long	10.50 to 11.00
No. 1 yard wrought, short	10.00 to 10.50
Light iron	5.00 to 5.50
Cast borings	5.50 to 6.00
Wrought turnings	5.25 to 5.75
Wrought pipe	9.50 to 10.00
Old car wheels	11.50 to 12.00
No. 1 heavy cast, broken up	11.50 to 12.00
Stove plate	9.50 to 10.00
Locomotive grate bars	8.50 to 9.00
Malleable cast	12.00 to 12.50

Crocker Brothers, 99 John street, New York, with offices also in Philadelphia, Pittsburgh and Boston, have been appointed exclusive sales agents, effective January 2, for the distribution of the several grades of foundry and forge pig iron produced by the Central Iron & Coal Company, Tuscaloosa, Ala.

Metal Market

NEW YORK, January 4, 1911.

THE WEEK'S PRICES

Cents Per Pound.

	Copper.			Lead.		Spelter.	
Dec.	Lake.	Electro-lytic.	Tin.	New York.	St. Louis.	New York.	St. Louis.
29	13.00	12.75	38.35	4.50	4.35	5.55	5.40
30	13.00	12.75	38.45	4.50	4.35	5.55	5.40
31	13.00	12.75	....	4.50	4.35	5.55	5.40
Jan.							
3	13.00	12.75	39.40	4.50	4.35	5.55	5.40
4	13.00	12.75	39.55	4.50	4.35	5.55	5.40

Large sales of pig tin have been made this week at higher prices than at any time in 1910. The demand for copper is so light that prices are decidedly nominal. Spelter continues to decline. Lead is firm but in little demand.

Copper.—Copper buyers seem to be entirely out of the market. Holders show no great desire to sell, and consumers are indifferent. Lake copper is being offered at 13c. and electrolytic can be had at 12.75c. It is probable that these prices might be shaded if a good sale was in sight. L. Vogelstein & Co. furnish the figures of German consumption of foreign copper, 157,088 tons as compared with consumption during the same period in 1909 of 136,403 tons. In London to-day spot copper was sold for £56 15s., and futures for £57 10s. The sales amounted to 350 tons of spot and 200 tons of futures. The market closed steady.

Pig Tin.—On the strength of statistics showing smaller Straits shipments and larger deliveries during December, the London market advanced sharply yesterday and at the close prices were £4 17s. 6d. higher than when the market closed last Friday. There was active buying here the latter part of last week by consumers who were forced to purchase by their actual needs. On Wednesday afternoon and Thursday it is estimated that about 700 tons of pig tin was bought for January and February delivery. Sales were made yesterday and to-day at a higher price than at any time in 1910. There is an absence of speculation in this market, as many traders seem to think that regardless of the favorable statistics quotations are somewhat inflated. Figures compiled by C. Mayer of the New York Metal Exchange show that the total visible supply on December 31 was 3724 tons below that of December 31, 1909. Available stocks in this country are still concentrated and there is no relief in sight for the buyer for at least 30 days. Pig tin sold in New York this afternoon for 39.55c. In London to-day the market closed with spot tin selling at £180 12s. 6d. and futures at £179 15s. The sales amounted to 420 tons of spot and 840 tons of futures. The market closed strong.

Tin Plates.—The tin plate situation is unchanged. The price for 100-lb. coke plates is $3.84.

Lead.—Prices are firm both here and in St. Louis, but demand is light. Outside sellers are meeting the quotation established by the leading interest in St. Louis but are asking from 3 to 5 points higher in this market. The price in New York is 4.50c., and in St. Louis, 4.35c.

Spelter.—The publication of the Government report on spelter tended to weaken the market, as it was a direct contradiction of the reports that the production of spelter had decreased. The statistics show that about 12,000 tons more was produced in 1910 than in 1909, while the consumption was 20,000 tons less. The statistics arrived a little earlier than had been expected and they occasioned no little chagrin among sellers who had previously declared stocks to be scarce. Buyers are taking so little interest in the market that prices are practically nominal. The market to-day was quoted about 5.55c., New York. By shopping about, spelter could possibly be picked up at less than that price. The Government figures show that the stocks on hand amounted to about 20,170 tons December 15.

Antimony.—Prices are lower. Cookson's is quoted at 7.55c.; Hallett's at 7.55c.; Chinese brands, 7.25c.; Hungarian grades, from 7c. up.

Old Metals.—Transactions are light. Dealers' selling prices are nominally as follows:

	Cents.
Copper, heavy cut and crucible	12.25 to 12.50
Copper, heavy and wire	11.75 to 12.00
Copper, light and bottoms	11.00 to 11.25
Brass, heavy	8.25 to 8.50
Brass, light	7.00 to 7.25
Heavy machine composition	11.00 to 11.25
Clean brass turnings	8.00 to 8.25
Composition turnings	9.00 to 9.50
Lead, heavy	4.20 to 4.25
Lead, tea	3.95 to 4.00
Zinc scrap	4.30 to 4.40

Metals, St. Louis, January 2.—Lead is quiet, quoted at 4.37½c.; spelter is firmer, with a range in price from 5.35c. to 5.45c., both at East St. Louis. Zinc ore is held at $38 to $40 per ton, Joplin base. Tin is stronger at 38.65c. per pound; antimony (Cookson's) unchanged at 7.85c.; lake copper ditto at 13.22½c.; electrolytic ditto at 13.05c., all at St. Louis. The demand for finished metals was seasonably quiet during the past week.

Metals, Chicago, January 4.—Several sales of casting copper were made last week at 12⅞c. Tin is higher. Spelter is somewhat steadier. We quote Chicago prices as follows: Casting copper, 12⅞c.; lake, 13c., in carloads, for prompt shipment; small lots, ¼c. to ⅝c. higher; pig tin, carloads, 40c.; small lots, 42c.; lead, desilverized, 4.45c. to 4.50c., for 50-ton lots; corroding, 4.70c. to 4.75c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.50c. to 5.55c.; Cookson's antimony, 10¼c., and other grades, 9c. to 10c., in small lots; sheet zinc is $7.50, f.o.b. La Salle, in carloads of 600-lb. casks. On old metals we quote for less than carload lots: Copper wire, crucible shapes, 12½c.; copper bottoms, 10½c.; copper clips, 12c.; red brass, 11c.; yellow brass, 9c.; lead pipe, 4¼c.; zinc, 4¼c.; pewter No. 1, 24½c.; tin foil, 30c.; block tin pipe, 33c.

New York Metal Market in 1910

The year's trading in the New York metal market in all non-ferrous metals in 1910 was not entirely satisfactory. With the exception of sensational advance in pig tin, resultant of a London corner combined with a close concentration of stocks in this country during the latter part of the year, and an interesting series of manipulations in the spelter market, the trade has had but little to occupy its attention in the way of price fluctuations.

Copper

Copper buying was sporadic. The history of the year's trading has been a series of buying movements, followed by deadlocks between sellers and consumers. There were few material changes in copper quotations, the year closing with quotations on lake and electrolytic copper exactly 1c. per lb. lower than at the beginning of 1910. In keeping with the industrial boom in January, lake copper, which had been hovering around 13.75c., sharply advanced to 14c. and electrolytic was put to 13.75c. On January 13 lake copper went to the high price of the year, 14.12½c., and electrolytic was put to 13.87½c. There was an absence of buyers, as many consumers had stocked up late in 1909, and regardless of the general industrial optimism the market sagged. This condition existed through February, and no actual demand occurred until early in March, when in a single week 25,000,000 lb. was bought. The copper producers and sellers very wisely did not attempt to boost prices, and these transactions were made at 13.75c. for lake and 13.37½c. for electrolytic. The publication of the statistics of the Copper Producers' Association, which was inaugurated in June, 1909, seemed to have little effect on the market, although about this time the statistics were showing a decrease in stocks, and exports were especially good. Toward the end of March the market sagged and prices fell off until about the middle of April, when lake went down to

THE IRON AND METAL MARKETS

13c. and electrolytic was correspondingly low. Consumers assumed a sudden change of front, and there was a rush to buy. Liberal orders were booked, amounting probably to 50,000,000 lb. during April, but the market went up only ¼c. and promptly fell back to 13c. until early in May, when the report again showed decreases in stocks and induced consumers to trade, but the buying was not very heavy. The market then weakened, until in June lake was down to 12.75c. and electrolytic to 12.50c. Again consumers bought heavily, and it appeared plain to the sellers that those using the metal were in a measure in command of the situation and would buy only at a low price. The buying movement lasted no more than 10 days, and July saw a period of dullness, during which the metal went to the low price of the year, lake being freely offered at 12.62½c. A great deal of copper was bought about that time, and the buying continued into August even against a rising market, as lake was gradually advanced to 13c. Consumers refused to take it at that price in quantities of any account, and during September there was so little buying that the market was practically nominal and slid back to 12.75c. for lake. In October the producers' report showed a decrease in stocks, and the market began to improve steadily and conservatively. It reached 13c. again for lake in November and remained at that price for the rest of the year. Not in a number of years has there been such an absence of speculation in copper. It is apparent that the publication of the producers' statistics has at least tended to put the market on a firmer basis.

Pig Tin

The history of the pig tin movement can be briefly told. There was a succession of advances during which the price went from 33.15c. on January 3 to 38.45c. at the end of the year, which was a rise of 5½c. on the price at the beginning of 1910. This was due largely to the operations of the London syndicate which had consumers entirely at its mercy. Since late in August available stocks in this country have been closely concentrated and in consequence consumers bought small quantities and only when they were driven by their needs. All things considered, the market here was an unsatisfactory one to both dealers and consumers. The leading consumer several times during the year lent its assistance toward putting the market on a fair basis for buyers. It even went so far as to offer its holdings for sale with a view to keeping prices down, and on two occasions exported stocks to Europe with the effect of weakening the London operator's hold. Pig tin reached the high price of the year December 16 when it was quoted at 40c. a lb., but that quotation was merely nominal as there were but few transactions.

Spelter

Manipulation in the spelter market went far toward keeping the consumers off, so that buying was more or less desultory all the year. The closing down of a number of spelter plants in the Kansas gas field in the fall of the year was given as one reason for a succession of advances in quotations, but consumers did not seem to accept the explanation and refused to buy at prices set by those who had the metal to sell. In keeping with quotations on other metals, except tin, spelter was at its high point early in the year. It was sold for 6.30c., New York, and 6.15c., St. Louis in January, but because of a decided lack of demand prices gradually declined until early in August when quotations went down to 5.20c., New York, and 5.05c., St. Louis. Then came the talk of shut downs in the Kansas gas fields, and within five weeks the metal went to 5.60c., New York, and a corresponding price was established in St. Louis. There was much talk of 6c. spelter. The producers declared that they could not sell the metal at a profit less than that price. A deadlock ensued which lasted until early in December. Then the sellers began to make concessions. Quotations gradually slid off and the year closed with spelter being offered at around 5.60c., New York, and 5.40c. to 5.45c., St. Louis, with few takers at those prices.

Lead

The lead market carried little interest during 1910. Prices were kept fairly steady, the market being only 20 points lower on the last business day of the year than it was in January. It opened at 4.70c. and gradually went down to 4.35c., the low point of the year, which was reached in May. From that time on the leading interest took charge of the market here, but outside sellers were in control in St. Louis. The American Smelting & Refining Company set its price at 4.40c., New York, in August and that was maintained until November 18 when a further advance of 10 points was made. The year closed with lead selling at 4.50c., New York, and 4.40c., St. Louis. There is talk at this time of a scarcity of lead which seems to be borne out by the statements of leading producers.

Iron and Industrial Stocks

NEW YORK, January 4, 1911.

The stock market has reversed its form since last week's report, and prices have quite uniformly moved upward, although the volume of transactions has been light. The course of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com..	8 - 8⅛	Pressed St., pref..	92¼- 93⅛
Allis-Chalm., pref.....	29	Railway Spr., com.	31 - 32
Beth. Steel, com..	28½- 29	Railway Spr., pref.	91⅝- 92
Beth. Steel, pref..	57 - 59	Republic, com.....	30 - 30½
Can, com.....	8½- 9⅝	Republic, pref.....	92½- 92¾
Can, pref.....	76 - 77⅞	Sloss, com.....	49¼- 49½
Can & Fdry, com..	49 - 51½	Pipe, com.....	16½
Car & Fdry, pref..114⅝-115		Pipe, pref.....	50½- 52
Steel Foundries...	43 - 45⅝	U. S. Steel, com...	70⅝- 73½
Colorado Fuel.....	30 - 31½	U. S. Steel, pref...116¼-117	
General Electric...151 -154		Westinghouse Elec.	65½- 66
Gr. N. ore cert.....	56½- 57	Am. Ship, com....	75 - 75½
Int. Harv., com...109 -111		Chi. Pneu. Tool...	41 - 42
Int. Harv., pref...122 -122½		Cambria Steel.....	42¼- 42½
Int. Pump, com...	39¾- 40⅜	Lake Sup. Corp...	28⅜- 29⅞
Int. Pump, pref...	85 - 85¼	Warwick	10¼
Locomotive, com..	36 - 39	Crucible St., com.....	12¼
Locomotive, pref..107½-108½		Crucible St., pref..	74⅞- 75⅞
Pressed St., com..	29½- 30⅞	Harb.-W. Ref., pref.....	94

Dividends.—The Pittsburgh Coal Company has declared the regular quarterly dividend of 1¼ per cent. on the preferred stock, payable January 25.

The E. W. Bliss Company has declared the regular quarterly dividends of 2½ per cent. on the common and 2 per cent. on the preferred stocks, both payable January 3.

The Chicago Pneumatic Tool Company has declared the regular quarterly dividend of 1 per cent., payable January 25.

The Hooven, Owens & Rentschler Company, Hamilton, Ohio, paid a dividend January 1 of 1½ per cent. on its preferred stock.

Judicial Decisions of Interest to Manufacturers

ABSTRACTED BY A. L. H. STREET.

Patent Invalidated by Prior Sale of Device.—A patent for a machine is invalidated by the fact that the inventor sold one of the machines, without restriction upon its use, more than two years before he applied for the patent.—United States Circuit Court of Appeals, Second Circuit, National Cash Register Company *vs.* American Cash Register Company, 178 Federal Reporter 79.

Infringement of Patents.—That there were two applications for patents pending in the Patent Office and before the same examiner at the same time, and no interference was declared, is evidence that they were not for the same invention, and that one patent does not anticipate the other. The Beckwith patent, No. 787,425, for a reservoir for stoves and ranges, claim 11, is not void for indefiniteness, nor for anticipation, but discloses patentable invention.—United States Circuit Court, Eastern District, Wisconsin, Beckwith *vs.* Malleable Iron Range Company 174 Federal Reporter 1001.

Loss of Rights by Delay in Applying for Patent.—One who, after inventing a device, postpones for five or six years application for a patent, and after the same device is patented by another, cannot assert his patent against the second inventor.—United States Circuit Court, Northern District of Illinois, Curtain Supply Company. *vs* National Lock Washer Company, 174 Federal Reporter 45.

Priority of Patents.—A patent for a mechanical combination is not anticipated by a drawing in a prior patent which incidentally shows a similar arrangement of parts, where such arrangement is not essential to the first invention and was not designed, adapted, or used to perform the function which it performs in the second invention, and where the first patent contains no suggestion of the way in which the result sought is accomplished by the second inventor. One patent is not anticipated by other patents which had not been granted when application for such patent was filed, though the other patents were prior in date.—Gray Telephone Pay Station Company *vs.* Baird Mfg. Company, 174 Federal Reporter 417.

Grounds for Reissue of Patent.—Before one is entitled to reissue of a patent, inadvertence, accident or mistake must be established, and the application therefor must be made without unreasonable delay. While the claims may be restricted or enlarged, they must be comprehended by the invention as specified in the original patent.—United States Circuit Court, Middle District, Pennsylvania, Bertels *vs.* Trethaway, 175 Federal Reporter 971.

Personal

E. T. Pardee, who has been for some years the district sales manager of the Allis-Chalmers Company for New England, with headquarters at Boston, was recently transferred to Milwaukee, where he will fill a much larger position.

The Toledo Machine & Tool Company, Toledo, Ohio, announces that G. M. Acklin is no longer connected with the company in the official capacity of secretary and treasurer.

J. K. Dimmick has accepted the presidency and active management of the Dimmick Pipe Company, Birmingham, Ala., manufacturer of cast iron pipe, effective January 1. Mr. Dimmick is senior partner in the pig iron and coke firm of J. K. Dimmick & Co., whose headquarters are in the Land Title Building, Philadelphia, Pa., with branch offices at Uniontown, Pa., and Cincinnati, Ohio.

F. P. Huston, sales manager of the Kempsmith Mfg. Company, Milwaukee, Wis., has left for an extended trip through Europe in the interests of the company.

The Pennsylvania Railroad Company announces that B. C. Wurthmann has been appointed freight solicitor, with office at 2 Beaver street, New York.

Edgar Lowenthal of Lowenthal & Co., Buffalo, N. Y., representatives of Vickers Sons & Maxim's Elco high speed steel, has returned from a six weeks' visit at the works in Sheffield. While abroad he also called at several of the other interests of the company throughout England.

Announcement is made by the Pittsburgh Coal Company and Colonial Coke Company that James McDonald has been appointed Western manager and H. J. Elliot Western sales agent, with offices in the Old Colony Building, Van Buren and Dearborn streets, Chicago.

R. C. Coombs, who for many years has represented the Stark Rolling Mill Company and the Berger Mfg. Company in Chicago, has severed those connections and is now engaged to take occupation with the Inland Steel Company, whose offices are in the First National Bank Building, Chicago. He will continue to care for his city trade and in addition will visit the large manufacturing and jobbing interests in the northern part of Illinois and the State of Iowa.

William C. Towns, master mechanic of the Wickwire Steel Company at its Buffalo plant on the Niagara River, was presented with a diamond ring by the employees of the plant December 31.

Ethan Viall, Western editor of *Machinery*, with offices in the First National Bank Building, Cincinnati, Ohio, has resigned his position to accept a place on the *American Machinist* as associate editor. With the resignation of Mr. Viall, the publishers of *Machinery* have decided to discontinue their Cincinnati office.

The Republic Iron & Steel Company will open a sales office in Buffalo, N. Y., about January 15, at 1007 White Building, to be conducted by M. E. Gregg, under the direction of D. C. Guthrie of the Cleveland sales offices of the company. Mr. Gregg has been the company's sales representative in the Buffalo district for some time.

Herbert L. Beeler, advertising manager of the R. K. LeBlond Machine Tool Company, Cincinnati, Ohio, has resigned that position, having acquired an interest in the John B. Morris Machine Tool Company, Cincinnati, of which he becomes general manager. Henry C. Pierle, who has been in the employ of the LeBlond Company for some time, will succeed Mr. Beeler as advertising manager.

William L. Schellenbach, formerly with the John B. Morris Foundry Company, Cincinnati, has resigned to accept a position as special mechanical engineer with the Lodge & Shipley Machine Tool Company.

The Carnegie Steel Company, Pittsburgh, Pa., announces that upon the retirement on December 31 of Samuel A. Benner, formerly general manager of sales, from his connection with the company, it was decided that H. P. Bope, first vice-president, would also assume the title and duties of general manager of sales.

Charles M. Schwab sailed for Europe January 3 for a short vacation trip, proposing to return on the same vessel.

Alfred Broden, general manager of the blast furnace department of the Reading Iron Company, Reading, Pa., was elected president of the Eastern Pig Iron Association at its regular monthly meeting in Philadelphia December 28.

Langdon Lea was admitted to the firm of J. Tatnall Lea & Co., iron and steel commission merchants, 1016 Stephen Girard Building, Philadelphia, Pa., January 2.

Obituary

ALFRED A. COREY, SR., died, December 29, at Thorndale, Chester County, Pa., where he had been living for two years on the old President Buchanan homestead, an extensive farm given to him by his son, William E. Corey, president of the United States Steel Corporation. Mr. Corey was 71 years old and was born near Braddock, Pa. For 20 years he was in business with his cousin, James B. Corey, a coal operator, but 18 years ago the partnership was dissolved and he retired from active business. He leaves a widow, two daughters and two sons, William E. Corey and Alfred A. Corey, Jr., superintendent of the armor plate mill at the Homestead Steel Works of the Carnegie Steel Company.

GUSTAVUS CHARLES HENNING died at his home in New York City, December 30, aged 55 years. He was born in Brooklyn, N. Y., and educated at the Brooklyn Polytechnic. In 1876 he was graduated at Stevens Institute, thereafter becoming inspector of material under the late William Hildenbrand on the Brooklyn Bridge. He traveled extensively abroad, introducing American testing machines, including many that were his own inventions. He was a member of the International Association for Testing Materials of Construction, the Iron and Steel Institute of Great Britain, the American Iron and Steel Institute, the American Society for the Advancement of Science, the American Geographical Society, the American Society of Mechanical Engineers, and the American Institute of Mining Engineers.

Columbia Tool Steel Company's Salesmen.—The salesmen for the Columbia Tool Steel Company celebrated their annual home coming at Chicago and at Chicago Heights December 29 and 30. The company had recently completed the beautiful new clubrooms at the works, where dinner was served to 18. The dining room is decorated in the old German style, one rather unusual feature being a piano for the use of the employees. A banquet was tendered them in the evening at the Chicago Athletic Club by Frank Matthiessen, vice-president of the company. Prizes were awarded for the best selling records and pledges made for the coming year. The company reports a very satisfactory year, the increase in sales being 34 per cent. over the amount for the year before.

The Lackawanna Steel Company announces that after January 19 its general offices, now at 2 Rector street, New York City, will be located at its works at Lackawanna, Erie County, N. Y., where all correspondence and communications for the president, vice-president and general manager, secretary, treasurer, general sales department and traffic department should then be addressed. The office of the assistant to the president will remain at 2 Rector street, New York City, where the company will also maintain a district sales office.

The Schuylkill Haven Rolling Mill Company, Schuylkill Haven, Pa., after a long idleness, resumed operations January 4. J. S. Hauscher, formerly of Wilmington, Del., will be in charge as general manager.

The Machinery Markets

So much inventory work is being done just now by manufacturers that buying details are being neglected. Another week will see the end of most of this work, and machinery purchasers will then be able to give more attention to quotations received against inquiries they have out. In the East the outlook for business is goods, as there are many enterprises in sight which will call for good expenditures. Specifications out in New England indicate that some good trading will come forward there, as three fair sized lists are in that market, while two other companies are expected to buy generously in the near future. Business is gradually improving in Cleveland. In Detroit there is an excellent outlook for a good call for machinery from the automobile industries. Reports from other markets are encouraging, and it is expected that within a week or so they will take on a more definite tone.

The New York Market in 1910

NEW YORK, January 3, 1911.

The year 1910 in the machinery trade was characterized by periods of unusual activity interspersed with seasons of depression. Never in the history of the trade was the market so sensitive to business changes as it was during the year just passed, and this condition led to some important readjustments in methods of selling equipment.

The year opened with many plans for factory expansion well under way, while a great deal of newconstruction work was planned for, and as a result of over confidence orders were placed more or less indiscriminately. Some classes of machine tools were ordered months ahead. Then came the first reaction of sentiment, followed by cancellations which were liberally accepted for a time. A succession of dull periods brought about a change of front on the part of manufacturers, and after much agitation in association circles many of them adopted stringent non-cancellation clauses. The result leaves the machinery market steadier at least, and buyers are now specifying closer to their actual needs.

At the beginning of the year there was a good volume of railroad business, and machinery manufacturers who did not own their own foundries had great difficulty in placing orders for castings. The foundrymen were so confident of a good year that they, as a rule, refused to accept contracts covering anything more than three months' supply. The leather belting manufacturers raised their prices 10 per cent. and encouraged by this many machinery manufacturers made slight advances in their quotations. The American Locomotive Company came into the market in January with requisitions for $500,000 worth of machinery for expansions, and later called for $150,000 worth for its automobile plant. Railroad lists, which had been absent from the market, began to appear and early in February New York machinery houses were bidding against inquiries for $1,000,000 worth of general machinery. Engine and boiler builders advanced their prices from 5 to 10 per cent. during that month and machine tools and special machinery were raised from 10 to 15 per cent. in price. Within a week, toward the latter end of February, orders were placed in the New York market for half a million dollars' worth of machinery covering a wide range of requirements. A great deal of this business was placed by the railroads and there were lists out from the carrying companies still to be heard from. The Bethlehem Steel Company contributed to the general prosperity during February and March by purchasing against an extensive list of machine tools, amounting approximately to $300,000. Machinery making plants were running to full capacity about this time and many of them were ordered up months ahead.

The Business Reaction

In April the trade saw something of a reaction and many inquiries were withdrawn, but the railroads continued to buy against lists issued earlier in the year. No new lists appeared, however, and the New York Central Railroad adopted a policy of sending out specifications for single machines instead of including its requirements in one list. Later other roads followed suit and to-day many of them are issuing duplicate pages, each devoted to specifications of a single machine. Some dealers get several of these sheets while others are favored with only one or two.

Although the railroads continued active during May, the demand from the general manufacturing trade fell off. A great deal of complaint arose over cancellations, and the matter was taken up at the spring meeting of the National Machine Tool Builders' Association, and many members declared their intention of accepting no further orders without the stipulation that cancellations would not be accepted.

The Delaware, Lackawanna & Western Railroad came out with a large list of machinery, but later announced that the business would not be closed for several months. Machine tool builders, who had been informing the trade that they could accept no orders for certain classes of tools over seven or eight months delivery, announced that they were in a position to deliver anything called for within three or four months. Late in June a number of railroads withdrew inquiries they had issued and declared that they intended to buy very sparingly because of the freight rate agitation and other legislation affecting the carrying companies. There was a sudden reversion of sentiment, and the machine tool business especially became decidedly dull. Many manufacturers who early in the year were turning down orders for machines for early delivery were out seeking business, as inquiries fell off perceptibly.

This condition continued throughout August. About that time the automobile manufacturers, who had been liberal purchasers, withdrew from the market, and the automobile supply trade suffered accordingly. A good export trade developed during September, and this helped to support the market, but there was almost a total absence of railroad buying.

The only branch of trade that did not seem to be affected was the second-hand business for which a good call continued and on which prices were well maintained. Business began to pick up in November and the Delaware, Lackawanna & Western Railroad began to buy against the large list issued early in the year. There was a short period of buying, and confidence had just about been renewed when there came another sudden slump. The market drifted along. Foundrymen, who early in the year had refused to make long time contracts for furnishing machinery castings, in many instances found their plants nearly idle, and the machinery manufacturers were just as unwilling to talk business as the foundrymen had been the first of the year. This condition continued until three weeks ago when the market again took an upward trend. It slowly gathered in strength, and last week there was about $50,000 worth of business in sight in the New York market, which was a larger volume of live inquiries than had been before the trade at any time during the previous two months.

The Outlook for the Future

The year opens with far less business in sight than there was at the beginning of 1910, but the market has an encouraging outlook. Many projects planned early last year were abandoned during the depression of the summer months and with a revival of trade they may reappear. It may be remembered that the year 1909 opened very dull in the machinery trade and closed decidedly strong. Conditions in 1910 were exactly the reverse, with the exception that the market to-day is in a better condition than it was eight weeks ago. Considering that the railroads and many manufacturers have adopted a decidedly conservative buying policy, it is thought that the gradual growth of business now under way may develop a firm and good machinery market.

Railroads Will Buy Sparingly

The strict policy of economy adopted by the railroads will be closely adhered to this year, according to present indications. A careful canvass of the important railroads, inquiring as to their machinery needs during the coming year, made by *The Iron Age*, has elicited replies from most of them which were by no means encouraging to the machinery trade. Out of more than 100 railroads addressed, no less than 55 have declared that they will make no improvements of any consequence, while a few others are undecided. In instances where reasons are given, legislation adverse to railroad interests is blamed for what is termed their enforced economy. The most important improvements contemplated are as follows:

The Great Northern is planning additions to its shops at Everett, Wash., which will require about $100,000 to complete. The additions will provide for a plant for building and repairing both freight and passenger cars.

The Pennsylvania will probably extend its electrical zone from its present Manhattan transfer at Harrison, N. J., about 30 miles further into that state, and the Hudson

THE MACHINERY MARKETS

& Manhattan which has taken over part of the right of way of the Pennsylvania into Newark, expects to complete its rapid transit line to Newark before the fall of 1911. The two companies are working in conjunction and it is expected that when the Pennsylvania is relieved of its Newark traffic it will carry out its electrification plans. The Pennsylvania will also buy for replacement in its Altoona, Pa., shops, and its large shops at Ilion, N. Y., but as yet the company has planned nothing in the way of extension to its shop system.

The Alabama Great Southern will extend its car repair shops at Gadsden, Ala., but with the exception of purchasing bolt machinery it has no plans for adding to its mechanical equipment.

The Chicago & Northwestern is building an addition to its Chicago shops, for which mechanical equipment has been provided, and the company states that it has nothing in contemplation for the new year with the exception of ordinary replacements.

The Delaware & Hudson, with main offices at 32 Nassau street, New York, has plans under way for considerable enlargements to its shop plants, but will hardly be in the market for machinery before 1912.

The Pittsburgh, Shawmut & Northern will extend its line 65 miles in the Pittsburgh district and will buy 30 engines and 2200 coal freight cars. The company also expects to reconstruct a portion of its shops for which plans are now being prepared.

The New York, Chicago & St. Louis Railroad Company will build a 28 stall roundhouse at Conneaut, Ohio, at an expense of $84,000, and a 9 stall addition to its roundhouse at Stony Island, which will cost approximately $27,000. The company has made an appropriation for shop tools amounting to $8500, which will be used for replacements and will add to its manufacturing facilities.

Some Forthcoming Enterprises

One of the largest projects calling for machinery expenditures expected to come before the trade this year is that of the General Electric Company, Schenectady, N. Y., which is establishing a large plant at Erie, Pa. The company has owned a tract of land at Erie for several years, and it now has a large foundry and other smaller buildings there. It is expected eventually to erect a general machine shop, and inquiries now out indicate that the company's plans will mature before the year is over.

The International Nickel Company has plans under way for an extensive plant at Roosevelt, N. J., near Elizabethport, where it has purchased 110 acres of land which will probably be used by the Orford Copper Company, a branch of the International Nickel Company. The Orford Copper Company is exploiting Monel metal, composed of copper and nickel, and it is said that the new plant will be devoted to the making of Monel metal sheets and castings.

A good demand for machinery is expected to develop from the enterprise of the Ottoman-American Development Company, which has been organized by interests closely connected with the MacArthur Brothers Company, of New York. The company has obtained concessions from the Turkish Government and will spend about $60,000,000 in the construction of a number of railroad lines and for the development of mining properties in Turkey.

The Corn Products Refining Company, 26 Broadway, New York, is expected to be a good customer in the machinery market during the year as the company is arranging to make extensive additions to its large Argo works in the suburbs of Chicago. The company has about 100 acres of land there, 25 acres of which are now occupied by buildings. The plans under way will provide for structures to practically cover the rest of its property. In addition to buying a large amount of power equipment the company will purchase a great deal in the way of special machinery.

The Gillette Safety Razor Company, Boston, Mass., which bought a large tract of land on Frelinghuysen and Evergreen avenues, Newark, N. J., expects to erect a building for the manufacture of frames for safety razors and safety razor blades at a cost of $200,000. The first building to be erected will be 81 x 200 ft. and will be of saw tooth construction. The company proposes to install a power plant of 500 hp. in addition to special steel making and grinding equipment.

The Week's News

The week's trading in the New York market has been devoid of developments. Buyers placed orders against a good volume of scattered inquiries but the holiday season naturally interfered with trading to some extent. The railroads are out of the market in this territory. Inquiries increased yesterday and to-day and most of them are of a nature to indicate that a good business will follow. Second-hand machinery continues in unusually good demand and used machine tools especially are bringing high prices.

The Union Tool Steel Company, with principal offices at Plainfield, and works at Annandale, N. J., has been organized to succeed to the business of George W. Astle of Annandale, manufacturer of mill picks and facing hammers. The new company will continue the manufacture of these tools, together with brick masons' trowels, brick hammers, stone masons' tools and cement workers tools. A 40-ft. extension has been made to the hammer shops, a 20-ft. addition to the grinding shop and a new engine and boiler house has been erected. The machinery installed includes a 45-hp. Chandler & Taylor engine, one 60-hp. Ames return flue boiler, one C. C. Bradley & Son compact hammer, one double column polishing and buffing lathe and a power hack saw. No further improvements are contemplated at present. T. F. Budlong, who for 20 years was secretary and treasurer of the Taylor Iron & Steel Company of High Bridge, N. J., is president of the company, George W. Astle vice-president and L. R. Budlong secretary and treasurer.

The Bayonne Launch Company, Bayonne, N. J., has been incorporated with $10,000 capital stock to manufacture launches and power boats. The company is erecting a building, 40 x 60 ft., clear story, at the foot of Thirty-sixth street and New York Bay, which will be equipped with the most modern woodworking machinery, operated with electric power. L. R. Schellenberger is secretary and treasurer.

The Marsh Valve Company, Dunkirk, N. Y., has been incorporated, with $250,000 capital stock, to manufacture a patented quick opening, double seal radiator valve. The company has opened a sales office in the Flatiron Building, New York. Its general offices are located at 305 Central avenue, Dunkirk.

City Engineer E. A. Fisher, Rochester, N. Y., is preparing plans and specifications for garbage disposal plant to be constructed by the city and for which the Common Council has appropriated $100,000.

Health Officer Dr. Charles F. Clowe, of the city of Schenectady, N. Y., has recommended the construction of a garbarge disposal plant by the city, and action upon the matter is to be taken at once.

The Fireproof Film Company of Rochester has contracted for the erection of a factory 55 x 520 ft., three stories, at Dewey and Ridgeway avenues, which will cost approximately $100,000. Henry Kuhn is president of the company.

Anthony Mosher & Son, carriage manufacturers, 397 Sheridan avenue, Albany, N. Y., are having plans prepared for a two-story brick factory building which they will erect on Sheridan avenue early in the spring.

The Buffalo Receptacle Company, Buffalo, N. Y., has been incorporated with a capital stock of $150,000, and will establish a plant in that city for the manufacture of garbage cans and refuse receptacles. Considerable machinery will be required in the way of shears, punches, presses, riveters, &c. Gustave Steinwachs, 1047 Genesee street, is manager.

The Pure Carbon Company, Wellsville, N. Y., has been incorporated and will erect and equip a factory building at Wellsville adjoining the Kerr Turbine Company's plant at South Main and Dyke streets.

The city of Batavia, N. Y., is contemplating the construction of a garbage incineration plant, plans for which have been completed by city engineer R. A. Wentworth and will be submitted to the Board of Aldermen January 11.

The Delaware & Hudson Company is completing plans for the erection of extensive repair shops at Albany which, with the requisite equipment, will call for the expenditure of between $1,500,000 and $2,000,000. It is expected that when the new shops are completed all of the company's heavy repair work for cars and locomotives will be centralized at Albany.

The Augustine Rotary Engine Company, 738 Ellicott Square Building, Buffalo, N. Y., has completed plans for additions, 50 x 100 ft., three stories, and 25 x 50 ft., two stories, which it will make to its plant at Elmwood avenue and the International Bridge branch of the Erie Railroad. Work will be commenced early next spring.

The Ramapo Iron Works, Hillburn, N. Y., has let contract to the Turner Construction Company, New York, for construction of a one-story and gallery building for the manufacture of frogs and switches, which it will add to its plant at a cost of $30,000.

The Beverwyck Brewing Company, Albany, N. Y., will erect and equip a two-story bottling works, contract for the building, to cost $25,000, has been let.

The factory building of the Electrolytic Products Company, Buffalo, N. Y., is approaching completion on the company's two-acre site at Elmwood and Hertel avenues, and manufacturing operations will be commenced as soon as the equipment is installed. The principal product of the company at the outset will be a seamless and solderless radiator for automobiles, made by the electrolytic process, under patents of Henry Porzel, the company's superintendent. Henry C. Steul is president and Frank A. Abbott secretary.

THE MACHINERY MARKETS

Chicago

CHICAGO, ILL., January 3, 1911.

The year opens with a very satisfactory volume of inquiries in the hands of dealers, who are encouraged to hope for an upward swing in their business in January. The railroads are figuring quietly on a considerable amount of business, without sending out inquiries or making their wants known to more than a few favored interests. In the manufacturing field of machine tool buyers there is a very encouraging growth in the volume of inquiries. A large proportion of this business is of a tentative character. Buyers are getting prices and investigating but in many cases they explain frankly that they will not actually place the business until there is a definite turn in affairs, or until they feel more confidence in going on with improvements and extensions which will necessitate the purchase of new tools. This waiting state has been quite general among industrial interests in the West during the past six months. Everyone has been waiting for someone else. During the fall the bankers were very conservative and advised against any preparations for an increase in production but now that money is becoming easier there is a general expectation that the turn in the tide is not so far ahead. The unexpected growth in the automobile trade two years ago contributed very largely to the demand for machine tools in 1909. The automobile people kept on buying during the first half of 1910 but cancellations of their orders during the summer and fall practically wiped out this market for the machinery dealer and proved a great disappointment. The depression in the railway equipment industries has also been a factor in the market. It will require considerable growth in the general market for machine tools to offset these losses. During December, however, conditions have been more encouraging than for a long time.

The Lalor Wagon Company, Chicago, has been incorporated with $200,000 capital stock. The incorporators are M. W. Lalor, D. K. Lindout and J. C. K. Lindout.

The Standard Oil Company proposes to expend $2,000,000 for improvements at the refining plant at Wood River, Ill. Work on a new building will be started in January, and the present working force will be increased to 700 men when the improvements are completed. The company, since its location at Wood River six years ago, has already expended nearly $3,000,000. It has seven filtering plants and 24 crude oil stills in operation.

Philadelphia

PHILADELPHIA, PA., January 3, 1911.

Purchases of machine tools or general equipment during the holiday week were, as might be expected, very meager. The month of December was a dull one, both with manufacturers and merchants, but from incomplete reports the volume of the year's business will probably not show up as badly as would seem to be indicated by that done in the second half. Manufacturers in many lines had a very satisfactory trade during the first six months of 1910, a good share of which was carried over into the second half and enabled them, even though the demand fell off sharply during the latter period, to maintain fairly active conditions during a good part of the last six months. In a few cases, particularly makers of special tools, the volume of business for the year is reported to have been in excess of that in 1909. It is difficult at this time to give any definite idea regarding the prospects for business in 1911. While a number of good propositions are under consideration, prospective buyers are for the most part making haste slowly, and, until the general iron and steel business shows some indication of greater activity, purchases will likely be made on a conservative basis.

The Elwood Ivins Tube Works has taken quite as much business in 1910 as in the previous year, and is now well fixed with orders. This concern has made a number of improvements to its plant during the past year and contemplates further extensions this year, although their exact nature has not yet been definitely decided.

The Pennsylvania Shafting Company, Spring City, Pa., reports a much more satisfactory year in 1910 than in the year previous. A new plant was erected during the past year for the manufacture of cold rolled flats, squares and hexagon bars. While current orders are not quite so large business is said to be satisfactory. One of the buildings of the company's plant was destroyed by fire on December 24. Rebuilding will be started at once and it is probable thot in the process of reconstruction, the efficiency of the plant will be increased.

The Hilles & Jones Company, Wilmington, Del., has received orders for the punching and shearing machinery to be installed in the new structural shop of Dietrich Brothers, Baltimore, Md., also for three boiler shop equipments for the Missouri Pacific Railway at Falls City, Kansas City, and Hoisington. An order for large plate shears for export to Australia has also been recently taken. Inquiries which have recently been received, lead this company to believe that business early in 1911 will be fair.

Current reports that the United Gas Improvement Company would erect a pipe mill at West Conshohocken, Pa., are erroneous. The company has purchased land at that place, with a view that when it had outgrown the present facilities of its Merion & Radnor Gas & Electric Company's plant at Ardmore, Pa., a new plant might be erected at West Conshohocken, to supply the Merion, Radnor and Conshohocken districts.

Revised plans are in preparation, it is said, for the new plant to be erected for the S. S. Wenzall Machine Company at Fiftieth street and Parkside avenue, while bids on revised plans for an eight-story manufacturing building, to be erected for John H. Smaltz, at Eleventh and Race streets, are being taken.

Joseph F. Hasskarl, acting director, Department of Wharves, Docks and Ferries, city of Philadelphia, will take bids until January 20 for the construction of a superstructure on Vine street pier, Delaware River. The estimated cost of the work is $400,000, although but $200,000 is now available, and the contractor will be obliged to enter into supplementary contract or contracts to complete the work. Plans and specifications may be had from the Department of Wharves, Docks and Ferries, Bourse Building.

Plans are about completed by Ballenger & Perrot, engineers, for a four-story garage, 80 x 105 ft., to be erected for Douredore Brothers at 2314, 2316, 2318 Market street. Estimates will be asked for early in the year.

Cincinnati

CINCINNATI, OHIO, January 3, 1911.

January, 1911, is the beginning of a year that is claimed by most machinery manufacturers and dealers in this section to hold out a more promising future than did 1910 at its commencement. However, actual business booked during the latter part of 1910 was somewhat disappointing in many lines. Automobile manufacturers were the best machine tool customers during the early part of the year, and when this business slumped off tool builders had to turn to the general trade for support, as the railroads bought only sparingly. For 1911 a large railroad business is anticipated, as it seems an impossible proposition, for several of the larger lines, especially, to keep out of the market much longer.

Lately a number of machine tool builders have been accumulating stocks, although a small number of them have picked up enough business to keep running on average time without having to resort to this to any great extent, and stocks on hand now would probably not exceed those carried at the corresponding period of last year.

Many additions were made to manufacturing plants in the Cincinnati district during the past 12 months. Among the latest completed factories is that of the Cincinnati Bickford Tool Company in Oakley, in which is now being installed the necessary equipment moved from the company's two old Cincinnati locations. Other Oakley plants that have been put in operation include that of the Cincinnati Planer Company, Triumph Electric & Mfg. Company, the Cincinnati Milling Machine Company and the Incandescent Light & Stove Company. The Victor Safe & Lock Company's Norwood factory, just completed, is one of the largest of its kind in the world. On Eastern avenue the Charles Boldt Glass Company and the R. K. Le Blond Machine Tool Company have both made large additions to their manufacturing facilities, and the latter company now has under construction a building that will be used mainly in the manufacture of its milling machines. In the West End section the Lunkenheimer Company is now occupying a new addition, giving it 200,000 sq. ft. more floor space. The Hisey-Wolf Machine Tool Company is moving into its new home on Colerain avenue, and farther out the Cincinnati Grinder Company and the M. L. Andrews Company are jointly occupying a recently constructed building. The American Valve & Meter Company will soon move to its new quarters on Spring Grove avenue, and almost opposite is a large addition just built by the Ohio Pattern Works. The United States Electrical Tool Company has under way a new plant that will greatly increase its output. The Lodge & Shipley Machine Tool Company built a pattern shop and the Schacht Mfg. Company will soon have in full operation a strictly modern factory for turning out automobiles and trucks. The John

THE MACHINERY MARKETS

B. Morris Foundry Company recently completed shops in which it will manufacture the Schellenbach lathe. From a construction standpoint, 1910 shows up well, and indications are that the improvements for the present year will at least equal those of the year just passed.

Kirk & Blum, Cincinnati, sheet metal workers, have decided to double their present plant's capacity and are working on plans for a building that will be two stories 40 x 150 ft., and of brick construction. The site has not been selected.

The Cincinnati Bickford Tool Company has practically all of its machinery moved into its new plant at Oakley, and will probably have it in full operation within the next 30 days.

At a stockholders meeting December 31, the name of the Rahn Carpenter Company, Cincinnati, manufacturer of machine tools, was changed to the Rahn-Larmon Company. John Rahn, Jr., was elected president and general manager, and A. J. Larmon, secretary and treasurer.

The American Tool Works Company, Cincinnati, is making a number of inside improvements to its plant, among them is a concrete wood-covered floor for its assembling room.

The annual stockholders' meeting of the Mowry Car Wheel Works, Cincinnati, will be held at the company's offices 2401 Eastern avenue, January 10. Five directors are to be elected.

To mine coal, the Wilsonburg Fuel Company has been incorporated at Grafton, W. Va., with $25,000 capital stock, by D. E. Brown, A. J. Glenn, L. B. Stevens and A. G. Bartlett, all of Clarksburg, W. Va., and E. C. Feather, of Newburg, W. Va.

The Crane & Breed Mfg. Company, Cincinnati, manufacturer of undertakers' supplies, is now occupying its new plant addition. The new structure is of steel and concrete construction, five stories and cost over $250,000 to build.

Woolcott Brothers, Winchester, Ky., expect to commence work early in the spring on a four story brick flour mill, to be erected at Lexington, Ky.

The Dentler Mfg. Company has been incorporated at Wheeling, W. Va., with $10,000 capital sock, by W. L. Dentler, Jacob Loomis, Charles E. Lynn, S. M. Noyes and A. B. Woodruff, all of Wheeling. It is the announced purpose of the company to do a general foundry business, including the manufacture of grate bars.

It is stated that the local branch of the Iron Molders' Union has effected a settlement with employers whereby an increase of 5 per cent. in wages is allowed. This agreement will last for one year and will quiet all talk of a strike on the part of the molders, which is understood, was to be called the first week in January.

New England

BOSTON, MASS., January 3, 1911.

Review of the Year

The past year in New England was characterized by varying experiences. No even depression developed, neither were conditions uniformly good. Some lines averaged an excellent twelve months, while others fell below the normal. Even in the same industry, where manufacturers or dealers are in direct competition, the individual curves of sales crossed and recrossed, up and down. The market lacked consistency. The average was neither very high nor discouraging. Omitting November and December, the figure should be fully normal.

The year opened well. Business everywhere in the metal lines enjoyed an excellent spring trade. The summer was not altogether disappointing, until the automobile industry entered into its slump. The early autumn saw some revival, and September and October were fair months with many houses. Experiences for November varied widely. December was dull, with indications of improvement during its closing fortnight.

The partial collapse of the automobile trade was the principal factor of the year. It affected the builders more than it did the New England dealers, because there are not many automobile factories in this territory. Shops that were running to full capacity were suddenly confronted with numerous cancellations, which under the custom then prevailing, they were compelled to accept. A complete reversal of the market came as a bolt out of the clear sky.

The automobile business should come back to some extent during 1911. The builders of pleasure cars are readjusting themselves to the new conditions. Curtailment is the rule, but at the same time the effort is being made to secure the most economical methods of production, which means replacements. The commercial car is a promising proposition for the immediate future, in the probable effect upon the machinery trade. The market is growing rapidly. The commercial car is being taken up by the builders of pleasure vehicles, and developed as a department of its own. So special has become the machinery used in automobile factories that equipment for the heavier vehicles will have to be purchased, much of that used in manufacturing light cars being ill adapted to the new purpose.

The railroads are coming into greater prominence as buyers. The men who as salesmen for railroad supplies are closest in touch with the trade assert that the companies are beginning to buy closer to their requirements, and have no stocks of supplies of any sort. In New England a large amount of machinery will be purchased, notably by the Boston & Maine system, during the new year.

The supply business has exceeded all records, including the big year, 1906, the former high mark. This feature of the trade is the more promising because of the fact that the stockrooms of customers are still practically empty. With machine tools the year's totals are well below the previous big year. Where the two lines are combined in one house, the machine tool end has pulled down the total to a good average business.

Of large customers, the electric business is fairly active in all of its varied lines, some of which are very busy. Shoe machinery has played an interesting role during the year, in the establishment of a great competing company, which was later sold out to the United Shoe Machinery Company. The corporation is now further concentrating the industry at Beverly, Mass., where large extensions are planned. The textile machinery people found business somewhat unsatisfactory during the last half of the year, and the same is true of paper machinery. The steam engine builders are not doing a rushing trade. Certain special lines of machinery that go chiefly to the export trade are normally busy. Export trade generally seems to be improving.

The year has seen an average amount of shop and mill construction, and announcements already made, coupled with plans not yet given to the public, indicate that 1911 will see an even greater growth of New England's industries, including machinery.

The trade is watching with eager interest the developments of the coming two months, in the hope that signs already noted will prove harbingers of a return of general industrial activity.

A sufficient number of favorable indications have come to light within the past week or two to give the machinery people greater confidence in the future. Current orders are not of large volume, naturally, in the face of the holidays and inventory taking. Inquiries are good, however, several lists being out, including those of the Lamson Consolidated Store Service Company, 161 Devonshire street, Boston; the Lake Torpedo Boat Company, Bridgeport, Conn., and the Guiler Engineering Company, 10 Broad street, Boston.

The Week's News

Marcus Mason & Co., Worcester, Mass., manufacturer of coffee and sugar machinery, which is controlled by the Guiler Engineering Company, 10 Broad street, Boston, is in the market for a considerable list of equipment, including a three ton electric travelling crane; a 36-in. pulley lathe, 36-in. engine lathe, with 14-ft. bed; 16-in. turret lathe; 18-in. engine lathe, with 12-ft. bed, 48-in. planer, with three heads; 6-ft. boring mill; horizontal boring mill; three spindle 20-in. gang drill, disc grinder, combination punch and shear, horizontal punch, 8-ft. rolls, bending machine, mortising machine, tenon machine, patternmaker's lathe and a 24-in. rotary planer. The company has acquired 7½ acres of land at South Framingham, where its new plant is under construction, the foundation being practically completed, while the erection of the steel work will begin within a fortnight. The initial unit of the works will consist of two buildings, each 70 x 175 ft., set together so that one heavy fireproof wall serves for both. One building will be devoted to the machine shop and plate department, the other to woodworking shop, shipping department, &c. The offices will have a building of their own. The present shops on Union street, Worcester, are inadequate, the business has grown very rapidly since it came into the possession of the Guiler Company four years ago. Full equipments for the cultivation and preparation of coffee and sugar are produced. The new plant will quadruple manufacturing capacity. The equipment at Worcester will be moved to South Framingham. The company plans to do a general machine business as well as to take care of its own lines. The matter of power is still under consideration.

The Gurney Heater Company, Franklin and Pearl streets, Boston, will not complete its new works at South Framingham until the warm weather. The plant will be a very large one, the plans calling for 175,000 sq. ft. of manufacturing space. The entire equipment will be new and nothing but the electrical apparatus has been contracted

THE MACHINERY MARKETS

for. In the spring the company will be in the market for a long list of machinery of various sorts, including machine tools, and also for cranes and other apparatus for the economical handling of the product.

The plans of the Ames Plow Company, Boston and Worcester, Mass., for its works in the immediate neighborhood with the Marcus Mason & Co., and the Gurney Heater Company, call for a general manufacturing building 200 x 325 ft. and one story; a building to be divided to give a space 60 x 180 ft. for the foundry and a similar area for the forgeshop; and a storehouse which will be two stories in the beginning, but arranged to go higher when the need shall demand additional space. The company has an edequate engine, but will require electrical equipment, as well as a considerable amount of machine tools and other manufacturing machinery.

The Lake Torpedo Boat Company, Bridgeport, Conn., manufacturer of submarine torpedo boats, will be in the market for a horizontal cylinder boring machine, a turret lathe, boring mill, universal milling machine and lathes, and possibly for a small punch and an angle shear. The company has just completed an enlargement of its plate shop, making the structure 40 x 160 ft., and is now adding a 50 x 79 ft. extension to its machine shop.

The Brunelle Boiler Company, 10 Coburn avenue, Worcester, Mass., manufacturer of steam and hot water heaters and heating specialties, has been incorporated, with some change of management, and proposes to increase the capacity of its works in the near future. F. X. Brunelle is the president, and J. A. Gervais, treasurer.

New England is directly interested in the organization of the National Boat & Engine Company, because the West Mystic Mfg. Company, West Mystic, Conn., is one of the companies which will be consolidated under the plans of the promoters. Allen H. Thompson, secretary and treasurer of the West Mystic Company, is a director of the new corporation, which, according to the statement, will take full ownership of the various properties.

The Windham Handle Company, South Windham, Conn., manufacturer of handles for axes, picks, hammers and edge tools, will remove the business to Willimantic, where a factory building has been secured. W. F. Maine, the proprietor, states that a considerable amount of pulleys, supplies, &c., will be required. A complete equipment of individual motors has been purchased.

The Peck Clark Company, Inc., Brookfield, Vt., has taken over the business of the Peck-Clark Company, which was established in Brookfield in 1835, and has purchased the French-Watson property at Hartford, Vt., and will remove there in the spring. No new factory will be erected. The company manufactures forks, hoes, rakes, can dogs and timber carriers.

The Hartford Automobile Parts Company, Hartford, Conn., has increased its capital stock by $48,600, to take care of investments already made and to provide additional working capital.

The Williams Sealing Corporation, Waterbury, Conn., manufacturer of bottle and jar caps, has increased its capital stock from $100,000 to $150,000. The new money will be used for the purpose of additional machinery, orders for which have been placed. The present factory has space to permit of the installation of the equipment.

L. M. Linnell, West Gardiner, Me., states that the 1300 acres of land in Canaan and Skowhegan, Me., which he proposes to submit to mining operations, is rich in brown ore, used only for the manufacture of iron. He plans to establish a shipping mine in the near future and believes that the location will render cost of production and shipping charges much less than in some Western localities where ore is mined.

Cleveland

CLEVELAND, OHIO, January 3, 1911.

Local machine tool and machinery dealers look for a gradual improvement in the volume of orders. A decided revival is not expected during the next two weeks but the fair volume of inquiries that came in during December, the greater part of which are still pending, will result, it is believed, in considerable business during the latter part of the month. During the week the market was exceedingly quiet, few orders coming out except for single tools, as is usual during the holiday season. Manufacturers are busy taking inventories and a number of plants were partially shut down during the week.

The outlook for a good demand for heavy handling machinery is quite promising. Some good sized work in the line of coal and ore handling plants is in prospect and is expected to come out early in the year, not yet having reached the point of asking for bids. While the past year had a quiet ending in most metal working lines manufacturers generally take an optimistic view of the situation and, basing their belief on the general conditions throughout the country, look for satisfactory year during 1911.

A new plant in the rubber industry in Akron, Ohio, to be known as the Federal Waterproofing Company, will be established early in the year. The company has been incorporated with a capital stock of $100,000 by H. B. Ball, W. H. Miller, F. S. Nash, H. H. McClosky and R. A. Carroll. It is stated that the plant will be located in one of the new additions at the plant of the Goodyear company.

The Cleveland office of the Detroit Stoker Company reports the receipt recently of the following orders for Detroit automatic stokers: Harvey Brothers, Cleveland, stokers for two 250-hp. boilers, for heating and lighting plant; Glidden Varnish Company, Cleveland, for 150-hp. boiler; Wellman-Seaver-Morgan Company, Cleveland, for a 300-hp. boiler; the Rauch & Lang Carriage Company, Cleveland, for 250-hp. boiler; the Great Lakes Engineering Works, for four 450-hp. boilers for its new Ashtabula plant, and four stokers for public school buildings in Cleveland.

The Brown Hoisting Machinery Company, Cleveland, reports the outlook good for orders for ore and coal handling machinery during the early part of the new year, several contracts now being in prospect. This company has recently secured an order for a coal handling plant to be erected at Tobata, Japan, this to be a duplicate of one built by the Brown company at the same point a few years ago.

The West Steel Casting Company, Cleveland, will enlarge its present foundry by an extension that will enable the company to double its present capacity. When installing its original equipment provision was made for an enlarged capacity and the addition will provide the additional floor space required. No new equipment will be purchased.

The Columbus Machine Company, Columbus, Ohio, has under consideration the removal of its plant to some more desirable location in a smaller city.

To provide room for further plant extensions as they are needed, the Silver Mfg. Company, Salem, Ohio, has purchased a 2½ acre tract of land immediately adjoining its present plant.

The Limbert Mfg. Company, Springfield, Ohio, has been organized with a capital stock of $20,000 to manufacture a flue blower, the invention of S. H. Limbert, who will be the president of the company. Offices have been opened in the Bushnell Building.

The Niles Iron & Steel Roofing Company, Niles, Ohio, formerly doing business under a partnership arrangement, has been incorporated with $40,000 capital stock. The incorporators are W. H. Pritchard, P. E. Pritchard, Ruth Naylor, Annie E. Pritchard and Olive V. Pritchard.

Baltimore

BALTIMORE, MD., January 3, 1911.

As far as the machine tool trade is concerned, neither manufacturers nor merchants, as a rule, offer very optimistic reports, either as to the past month's business or that for the entire year. Buying was fairly active early in 1910, but declined rapidly during the second half, and in the last quarter was almost at a standstill. In other lines identified with the iron and steel trades more favorable conditions are noted, although the decline in activity during the last three or four months was almost universal. Building work in Baltimore was extensive, particularly of the large office building and warehouse classes, resulting in a very satisfactory business for structural materials, power installations, elevator and smaller machinery equipment. Fabricators of structural material had a record year. A large amount of work was carried over from 1909, which together with a fair amount of new work, kept plants operating at utmost capacities during the greater part of the first eight months; as the decline became sharper, operative work decreased, and at the close of the year represented on an average about 50 per cent. of the capacity. It is estimated that during 1910 the aggregate tonnage of structural work placed in Baltimore and nearby, was from 40,000 to 50,000 tons. Merchants report a very fair business in boiler and engine work, a good share of which has been power equipment in buildings. From this same source there developed an unusual demand for heating and ventilating work, and engineers in that branch of the trade have exceeded all previous records in volume of business taken. Machine shop supplies have been in irregular demand throughout the year, but the aggregate business will, it is believed, about equal the average. Contractors' supply and equipment merchants report a rather quiet business, due to a large extent to inactivity of the railroads. Conditions varied considerably in the foundry trade. The light demand for machinery resulted in makers

THE MACHINERY MARKETS

of that class of work operating below normal capacity, while the heavy demand for castings entering into building construction kept foundries producing castings of that class pretty fully occupied. Municipal work of various kinds contributed a good share of business to the different branches of the trade, and there is a good prospect for further activity during 1911 from the various city departments. The year has not been without difficulties between labor and employer. Iron molders and pipe fitters, among others, made demands for wage advances. The molders' strike is still on, although foundries are in no way inconvenienced; in other branches of the trade, arbitration prevailed, after delays of various periods.

Proposals will be taken during the week for a central power plant, comprising boilers, engines and generators, as well as heating and ventilating systems for a new Blind Asylum being erected at Overlae, Baltimore county, Md. Charles L. Reeder, Baltimore, Md., is the engineer.

Stein Brothers are erecting an addition to the plant of the Joseph Kavanaugh Company, coppersmith, Pratt street and Central avenue. The new building will be two stories, 14 x 60 ft.

The Baltimore Siegwart Beam Company has been incorporated with a capital stock of $150,000. Land covering an area of about six acres has been acquired at Curtis Bay, and plans are under way for the erection of a plant to manufacture the Siegwart beams, which are of hollow reinforced concrete construction.

The Ellicott Machine Works reports business during 1910 to have been up to the normal average. The plant has been operated on a fairly even basis and considerable work in heavy dredging machinery is now in prospect. This concern materially increased in machine shop facilities during the year.

Proposals are being made on a new Young Men's Christian Association building to be erected in Columbia, S. C. About 250 tons of structural steel work will be required. Strand & LaFaye, Columbia, S. C., are the architects and engineers.

Bids for a new factory for the Canton Box Company, manufacturer of wooden boxes, will be taken to-day. The building is to be of structural steel frame, requiring about 120 tons of material.

John Dadt has taken a number of orders for special machinery recently, principally, however, for tobacco manufacture. Some good business in elevator and general machine work is pending. Continued activity throughout the year is reported, although the largest volume of business was done during the first eight months of the year. An average business is reported in machine shop and general supplies.

Plans have been practically completed for the new power house for the Union Power Company, Hagerstown, Md., and the engineer, O. G. Keilholtz, Continental Building, Baltimore, Md., will, it is stated, be ready to take bids at an early date.

The Baltimore Retort & Fire Brick Company reports a very satisfactory volume of business during the past month, exceeding that for a like period in 1909. Recent orders include two benches of gas retorts for the Orlando Gas Light & Fuel Company, Orlando, Fla., and one bench of retorts for the Lock Haven Gas Light & Power Company, Lock Haven, Pa., as well as a large number of orders for special and general fire brick shapes. The year's business shows an average increase over that for 1909.

The award of contract for the erection of the proposed new building for the Baltimore Bargain House has been temporarily held up, pending some changes in plans and revision in estimates.

The T. C. Bashor Company reports a record volume of business during the year, even though the closing months have been rather inactive. In heating and ventilating engineering work business was extremely heavy. A fair business in boiler and tank work is reported, while a very satisfactory trade in engines has been done. Recent orders for tank work include some good contracts for acid tanks for the Atlantic Fertilizer Works, Baltimore, Md.

The Crook-Kries Company has the contract for the heating and power plant for the new addition to the Mercy Hospital. Two Erie Ball engines, direct connected with electric generators, will be supplied. A number of contracts for general heating installations have also been booked. This concern reports a very satisfactory volume of business during the year and is carrying considerable work over into 1911.

The Department of Public Improvement, sub-department of the city engineer, Baltimore city, will take bids until January 11 for a quantity of supplies and materials to be furnished during 1911. Separate proposals will be received, among others, for tools and hardware, paints and oils, sewer traps, inlet covers, cast iron manhole covers and frames and miscellaneous materials. Specifications may be obtained from B. T. Fendall, city engineer.

Bartlett, Haywood & Co. have had a normal year. While general business fell off at times, a number of large orders enabled the various departments of the plant to maintain about an average rate of production. This firm still has under consideration a material addition to its machine shop, both in the way of buildings and equipment, but, in view of decreased business activity toward the close of the year, is holding the matter in abeyance.

The Commissioners of the District of Columbia, Washington, D. C., will receive bids until January 10 for the construction of a central heating plant and boiler house at M Street High, Simmons and Douglass Schools in that city. Information may be obtained form the chief clerk, Engineering Department, Room 427, District Building, Washington, D. C.

Sealed proposals will be received on February 1, 1911, by F. W. Keating, superintendent of the Maryland Asylum and Training School for the Feeble Minded, Owings Mills, Baltimore county, Md., for the erection of a number of buildings in connection with that institution, including a manual training and assembly building, a single and a double dormitory and day room building, and a dining room and dormitory building, according to plans by Ellicott & Emmart, architects, Union Trust Building, Baltimore, Md., from whom plans may be obtained on payment of a small deposit.

The Baltimore Bridge Company reports the past year to have been the largest in point of tonnage output which it had ever had. A large amount of work was carried over from 1909, which together with new business kept all departments exceedingly active during the greater portion of the year. During the closing months of the year, however, business dropped off considerably, and during December the plant was operated at about 50 per cent. of capacity, with sufficient work on the books to keep it so engaged for several months ahead. Among recent orders taken by this company was one for a 150 ft. bridge span for export to Costa Rico.

The Chesapeake Iron Works has recently taken contracts for structural steel work for a new bottling house for the Fred. Bauernschmidt Brewing Company, Baltimore, Md., and a moderate structural job for a new hotel at Silver Springs, Md., together with a fair amount of miscellaneous work. On the whole the volume of business taken during December was about normal and larger than that of the previous month. The output for the year was the largest in the history of the plant, although the bulk of the business was done during the first nine months of the year. Increased facilities completed during the year by the Chesapeake Iron Works increased its facilities for production fully 50 per cent.

Dietrich Brothers have been awarded contracts recently for structural steel work for a new building for the National Casket Company, this city, for a new plant for Becker Brothers & Son, and for an addition to the department store of the Hutzler Brothers Company. Each of these will require about 100 tons of material. They have also received a contract for the structural and ornamental iron work for the new building for the Riverside & Dan River Cotton Mills, Danville, Pa., and for the structural work for a new library known as the No. 15 Pratt Library in this city. The new office building of Dietrich Brothers, previously mentioned, is about under roof, while work is progressing rapidly on the new additions to their structural and ornamental iron shops. The bulk of the equipment for these new additions has been purchased, although they are still in the market for small punches and for drilling machines. Business during 1910 with this concern will largely exceed in volume that of the previous year.

The Charles J. F. Steiner Mantle Company, Baltimore, Md., has plans for new buildings to be erected at Monument and Eleventh streets. The main building will be one story, 80 x 160 ft., of brick and concrete, and there will also be a dry kiln, 40 x 85 ft. and a power house, 32 x 40 ft., mill construction. When completed the plant will cover two city blocks. All the buildings will be of modern construction, and each will be separated from the other by a 20-ft. alley. Charles J. F. Steiner, 403 Builders' Exchange, is president of the company.

St. Louis

ST. LOUIS, January 2, 1911.

Only a fair run of business has been done here the past week, but the movement in the way of new small enterprises, noted once or twice before, still continues and there seems to be a pretty well defined undercurrent of increased confidence. Some very good orders have been placed recently for the lighter manufacturing equipments, such as automatic screw machines, &c., of which St. Louis is gradually becoming a greater consumer. Machines driven by individual motors seem to be rapidly gaining approval, and a much larger pro-

THE MACHINERY MARKETS

portion of such machines is being sold all the time. A rather interesting order reported is for half a dozen motor-driven machines, including several made by the American Tool Works Company, to go into the private garage of a local capitalist. There has been some movement of second-hand machines, but most dealers do not look for much activity in that department until the spring season opens. Good stocks are being carried by several of the St. Louis dealers.

Albert B. Bowman, St. Louis, states that there are now seven live machine tool houses in this city. His own firm carries constantly in stock upward of 50 sample machines and high grade machine shop equipment.

The Radio Gas Producer Company, St. Louis, has been incorporated, with a capital stock of $50,000, one half paid. The incorporators are J. W. Kolar, A. J. Cunningham, M. C. Burgman and others. The company will engage in the manufacture of electrical apparatus, &c.

The plant of the St. Louis Machinery Company, 606-608 South Vandeventer avenue, St. Louis, was partially destroyed by fire December 29. The loss is estimated at $12,000.

A portion of Walter Vanstines furnace and sheet metal works at Kansas City, Mo., was wrecked by dynamiters December 30, causing considerable loss.

The Kahoka Flour Mills at Kahoka, Mo., will hereafter be known as the Baldwin Milling Company, Kahoka. It is the intention of the new company to at once make improvements in the mill.

The Pioneer Iron & Steel Company, Kansas City, Mo., has been incorporated with a capital stock of $10,000. The incorporators are D. S. Rettig, L. C. Rettig and M. Andrews.

The Sheffield Sash Weight & Mfg. Company, Kansas City, Mo., has increased its capital stock from $7500 to $10,000.

The Williams Motor Car Company, Kansas City, Mo., has been incorporated. The capital stock is $10,000. The incorporators are W. A. Williams, Norman Wilson and W. H. Blodd.

The Siloam Spring Ice & Cold Storage Company's plant at Siloam Springs, Ark., was destroyed by fire December 22, causing a loss of $150,000 with $50,000 insurance.

The plant of the Mulberry Cotton Oil Company, Mulberry, Ark., was destroyed by fire December 18, entailing a loss of $80,000, fully covered by insurance.

The sawmill of the Homan Lumber Company, at Homan, Ark., was destroyed by fire December 21, resulting in a loss of about $35,000, with insurance of $25,000. It is announced that the plant will be rebuilt at once.

The Hayton Pump Company, Hannibal, Mo., has been incorporated to manufacture turbo-centrifugal high pressure pumps. The pumps are the invention of T. R. Hayton, and it is claimed they show a large gain in efficiency over many others now on the market, the gain ranging from 20 to 50 per cent. The company has made arrangements with the Leader Foundry Company, Quincy, Ill., for the manufacture of the pumps.

The Wellsville Light, Power & Water Company has been incorporated at Wellsville, Mo.

The Empire District Electric Company, Joplin, Mo., has, in addition to plants mentioned last week, acquired the plant of the Columbus Electric Company, Columbus, Kan., which has a capacity of 125 kw., and will make it a substation of its Riverton plant, with corresponding alteration of the equipment.

Milwaukee

MILWAUKEE, WIS., January 2, 1911.

Reports received from all of the manufacturing cities of Wisconsin, coupled with a compilation carefully made in Milwaukee, demonstrate that, notwithstanding the dragging trade of the last five or six months, the past year has been one of extraordinary growth in every branch of manufacturing. This is inclusive of machinery building, foundry output, bridge and structural steel fabricating, sheet and ornamental metal shaping and metal working generally. More new plants have been built, more extensions made, more machinery added or replaced and more operating economies effected than in any previous period of the same length. In the interior of the State and among the industrial suburbs of Milwaukee the development has been especially pronounced.

A noteworthy feature of construction during the year, and one of particular interest to the machinery and supply trade, is the number of light manufacturing buildings, furnished with electric motor drive, steam heating, sprinkler or other fire extinguishing systems, forced ventilation, &c., which have been erected in the business districts of Milwaukee and other cities of Wisconsin. For nearly all of these a high grade of equipment has been specified. The selection of the apparatus is frequently left entirely to the supervising architects, and their knowledge of what constitues true economy has been strengthened remarkably within the year, having, in many cases, been formerly an almost negligible quantity.

In current business there is the usual holiday dullness, and, while most concerns are taking account of stock, there will not be much buying. By the middle of the month, however, things will undoubtedly liven up, and every indication points to a good run of sales preceeding spring construction.

A plant for the manufacture of steering gear for automobiles and motor trucks will be established by the Universal Mfg. Company, Racine, Wis., which was recently incorporated by Wallace McGregor and others. The machinery needed has already been contracted for, and a factory which was vacant is being fitted up for the company's use. Later on a plant especially adapted to its work will probably be built.

The contract for the electrical work in the new plant on Commerce street, Milwaukee, of the Milwaukee Grains & Feed Company, has been let to the Herman Andrae Electrical Company.

The enormous new foundry to be operated here by the International Harvester Company is now well under way, and construction will be pushed to early completion.

A new industry in Racine is that of the Reliance Wrench Mfg. Company, which has made a contract with the Racine Foundry Company for castings and with the Belle City Mfg. Company for other work exclusive of assembling, which will be done in its own shop. These arrangements are, however, only preliminary to the erection of the company's own plant, which will be built as soon as the conditions warrant. The officers of the company are Andred Matson, president; Nels Christianson, treasurer, and William H. Hartig, secretary. The wrench to be manufactured is of a quickly adjustable type adapted to a wide range of service.

Preliminary plans have been made for the buildings of the Home Brewing Company, including power plant, refrigerating system, &c., which are to be erected at North Milwaukee, Wis., and the matter of construction will soon be decided upon, followed by the purchase of machinery and other equipment. A bottling house, with modern automatic apparatus, will form part of the establishment.

Plans have been completed at Bayfield, Wis., for the new boiler house to be erected in connection with the municipal power and pumping plant. The work will not, however, be started until spring.

Bids on the construction of the Hummel & Downing Company's new factory in Milwaukee, including power and coal handling plant, will be taken in separate parts within the next few weeks, and the purchase of machinery will shortly be considered.

The Peck-Hamre Mfg. Company, Berlin, Wis., is remodeling its power system. Work on a new building, in which a boiler and engine will be installed, was recently started, and changes will be made in the factory equipment.

Extensive steam generating and power equipment, as well as operating machinery, will be required for a new plant, which the Hansen Malting Company is to erect on the outskirts of Milwaukee, near the new works, of the Globe Seamless Steel Tubes Company. F. L. Bader of this city is preparing the plans.

The project of installing a new pumping engine of 1,500,000 gal. daily capacity at the Sparta, Wis., water works, which has been hanging fire for the past eight months, recently reached the stage where definite action has been determined upon. Bids on the unit and other necessary equipment are now being taken.

From Superior, Wis., which is the seat of Douglas County, it is reported that the Board of Supervisors will purchase a rock crushing plant to furnish material for improvement of the roads.

The contract for a very complete steam heating system to be installed in the factory of the Holeproof Hosiery Company, Milwaukee, has been placed with the Independent Power, Heating & Plumbing Company.

The Morehead Mfg. Company, Detroit, through its local representative, the Alliance Engineering & Sales Company, will furnish the tilting return steam traps for the new buildings of Albert Trostel & Sons Company, Milwaukee. Contracts for other equipment are now being placed. A modern oil storage and pumping system is to be installed, but the details of this have not yet been taken up.

An addition is being made to the manufacturing plant of the Ahnapee Veneer & Seating Company, Birchwood, Wis., and new machinery will be required.

The city of Manitowoc, Wis., is endeavoring to acquire the local water works, and in the event that it does so the pumping plant will be enlarged.

Plans for a five-story light manufacturing plant, to be

THE MACHINERY MARKETS

erected by Jacob Wellauer in this city, are being prepared by H. Messmer & Son, Milwaukee.

An electric power and lighting plant is to be installed at Horicon, Wis., by the Horicon Light & Power Company, whose main office is at Beaver Dam, Wis.

The Standard Mfg. Company, Appleton, Wis., has under construction an addition to its plant. All of the equipment, with the exception of some minor details, has been contracted for.

The report has recently been current that a further extensive hydroelectric development would be undertaken at Hatfield, Wis., in consequence of the sale of the power plant there, now owned and operated by the La Crosse Water Power Company, to the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company; but there appears to be no truth in this statement.

A repair shop will be installed by the Buick Motor Company in connection with a large garage to be erected shortly at Marinette, Wis.

A new power house is about to be built to furnish steam heat and electric current for the Mendota Insane Asylum, which is under the direction of the State Board of Control, Madison, Wis.

It is reported from Appleton, Wis., although without direct confirmation, that considerable new machinery will be required by the Appleton Chair Company, in consequence of a fire which destroyed its old factory just as it was about to remove the equipment to a manufacturing plant recently built.

The Ashland Light, Power & Street Railway Company, Ashland, Wis., is about to proceed with its plans for another hydroelectric development on the Bad River near Copper Falls.

The South

NASHVILLE, TENN., January 2, 1911.

For the year that has just closed the industrial record of this section was one not only gratifying in itself but also replete with promise for the future, and in all lines of production the feeling at present is optimistic.

A Corliss engine and two triplex pumps of about 2,000,000 gal. daily capacity each will be among the requirements of the new water works station at Aiken, S. C., the plans for which are now being drawn.

Wythe M. Peyton, engineer of the Isothermal Traction Company, Rutherfordton, N. C., is completing plans for the construction of the electric railroad line which that company proposes to build from Gastonia to Asheville, N. C., and to operate by means of hydroelectric power. It will be some time, however, until the purchase of machinery needs to be considered.

Arrangements are now in progress for the erection of a plant, with buildings 50 x 50 and 20 x 30 ft., designed for 50 tons daily capacity, by the Claremont Carbonate Lime Company, Claremont, Va.

M. E. Melvin, Port Gibson, Miss., is considering the installation of a small power and lighting plant to serve a local institution.

The purchase of equipment will need to be taken up by the Alabama Traction Company, Montgomery, Ala., in the near future, as work on its new electric railway line will be started at once. C. G. Abercrombie, president, is actively in charge. The project is one of considerable importance to the industrial development of that section.

The Trenton electric light plant, operated by Keenan & Wade, Trenton, Tenn., which has a present capacity of 100 kw., is to be acquired and enlarged by the Trenton Electric Light Company, incorporated for the purpose.

A city pumping plant has been decided upon at Jonesboro, N. C.

The Business Men's Club, Memphis, is reported to be negotiating with John F. Walsh, of Pittsburgh, Pa., for the location in that city of a branch factory for the production of automobile trucks.

J. J. Brophy, whose address is given as Pittsburgh, Pa., is organizing three electric traction companies to operate lines between St. Augustine and Tampa, Fla.

The erection of a plant for the manufacture of onyx products is being planned by the Crystal Onyx Company, Candler Building, Atlanta, Ga. E. W. Torrance represents the company.

The city of Alexandria, La., through its Progressive League, is making an effort to secure new industries and solicits correspondence on the subject.

The Gadsden Car, Foundry & Machine Company, Gadsden, Ala., is completing additions to its buildings and equipment which will give it considerably enlarged facilites for the work of the coming year.

The Mandeville Electric Lighting Company, Mandeville, La., is reported to have under consideration the extension of its system to Abita Springs, with consequent provision for enlarged equipment.

The town of Roberta, Ga., will take bids about January 20, through W. J. Marshall, Lizell, Ga., for the construction of an electric power and pumping plant, water distribution system, &c., together with the necessary equipment. Knoxville, Ga., will also be supplied from the same plant.

The Excelsior Foundry & Machine Company, Columbia, Miss., which was incorporated in November, has completed the equipment of a plant, with the exception of machinery that will be needed later for the manufacture of certain specialties. For the present its operations will be confined to general jobbing and repair work.

The New South Pittsburg Light & Power Company, South Pittsburg, Tenn., will remodel and enlarge its 150-kw. plant.

C. B. Parsons and others of Detroit, Mich., are reported to contemplate erecting a plant at New Orleans, La., for the manufacture of power boats, and are about to visit that city for the purpose of selecting a suitable location.

North Pacific Coast

SEATTLE, WASH., December 30, 1910.

Machinery houses here who have recently been going over their prospect files, find that there is a very satisfactory amount of business requiring attention at the beginning of 1911. It covers a wide range and appears to be distributed among the various industries of this section about in the order of their relative importance, indicating a sound, healthy development, without abnormal features. This augurs well for a steady continuance of the demand in the several lines of trade. The most pronounced increase appears to be shown in the requirements of metal and woodworking plants, the latter being considerably in the lead so far as volume of investment is concerned, but closely followed by the former in percentage of gain.

The Vulcan Iron Works, Seattle, is preparing models of machinery, showing its more important specialties, to be installed in the exhibit room of the Seattle Chamber of Commerce, where it will make a very comprehensive display. None so elaborate has ever before been attempted here.

A large new generating plant will be erected in Chehalis, Wash., by the Twin City Light & Traction Company, which now operates an engine-driven station of 350 k. w. capacity. The headquarters of the company are in the Fenton Building, Portland, Ore.

The Gilbert Hunt Company, successor to the Gilbert Hunt Manufacturing Company, Walla Walla, Wash., has received a contract from the United States Reclamation Service for steel headgates to be installed in the works necessary for the Boise project.

A plant for the distribution of electric power in the district above Springfield, Ore., is to be erected by the Northwestern Corporation, whose generating station is located at Eugene, Ore. It has not yet been decided, however, how soon this project will be carried out. When it is, additional power units will probably be required at Eugene, with transformers, &c., at Springfield.

The properties of the West Coast Mines Company at Bohemia, Ore., have been sold to new interests, and a large sum of money will be expended in making improvements. It has not been announced whether any change will be made in the style of the company.

The system of the Portland Gas & Coke Company, Portland, Ore., is to be enlarged and improved, the directors having authorized an expenditure of $750,000 for the purpose.

The Northwest Coal Company, George S. Rankin, president, North Yakima, Wash., will install mining machinery and other equipment for the development of its coal land between Ellensburg and Thorpe, Wash., where considerable preliminary work has already been done, opening up a 14-ft. vein at 250 ft. depth.

It is reported from Eugene, Ore., that the Barr Brothers-Rogers Cutlery Company of that place will build a plant at Palo Alto, Cal.

Frank S. Ernest, Spokane, Wash., has acquired mining properties in the vicinity of Chewelah, Wash., and will install an air compressor, drills, hoist, pump and power machinery for their development.

The Stayton Elecric Light Company, A. L. Shreve, manager, has acquired the site for a hydroelectric plant, capable of developing about 3600 kw. on the Stayton River, about three miles above the town. Work on this development will probably begin before fall. The company is at present operating a plant of moderate capacity in which a Westinghouse generator is driven by an S. Morgan Smith Company's turbine.

A bond issue of $30,000 for the construction of water works has been authorized at Falls City, Ore.

The contract for an auxiliary steam power plant in Portland, with complete equipment, has been placed with C. E. Moore & Co. by the Mt. Hood Railway & Power Company, Portland, Ore.

THE MACHINERY MARKETS

The International Lime Company, Kendall, Wash., whose headquarters are located in the Alaska Building, Seattle, is preparing to install the machinery for its new plant.

The growing importance of the market for power and electrical equipment in the far north is shown by advices from Dawson, Yukon territory, to the effect that a 10,000-hp. steam plant has just been completed on Coal Creek by the Northern Light & Power Company, and that one of the same capacity is just being finished by A. N. C. Treadgold of the Granville Mining Company. The power is to be used in both cases largely for dredging operations.

Indianapolis

INDIANAPOLIS, IND., January 3, 1911.

Thomas L. Green & Co., Indianapolis, have been incorporated, with $40,000 capital stock, to manufacture bakers' machinery. The directors are T. L. Green, A. P. Green, L. T. Sereinsky and J. H. Green.

The Diamond Chain & Mfg. Company, Indianapolis, has called in its preferred stock for redemption.

The Union Trust Company, receiver for the Parry Auto Company, Indianapolis, has been instructed to sell the plant January 10. The prospects are there will be at least two bidders for the plant, the creditors and a company represented by W. C. Teasdale, Jr., vice-president of the Parry Company. The court has set a minimum price of $50,000. The plant was appraised at $139,000 as a going concern.

The Peru Electric Company has been incorporated at Peru, Ind., with $100,000 capital stock, to manufacture electrical supplies. The incorporators are William H. Zimmerman, J. N. Miller and J. Kramer.

The Park Furniture Company, Rushville, Ind., has let the contract for an extension, 58 x 113 ft., to the plant.

George R. Harper has been appointed receiver of the Goshen Rubber Works, Goshen, Ind., with instructions to sell the real estate and personal property. The plant was abandoned several years ago.

The Laporte Meter Company, Laporte, Ind., has been incorporated, with $150,000 capital stock, to manufacture gas meters. The directors are V. P. Wilkins, Emmet Scott and Emmet H. Scott.

S. D. Rowland has purchased the electric light plant of Mitchell, Ind., which has been a losing venture ever since the city constructed it 15 years ago. Mr. Rowland has been granted a franchise for furnishing water.

The Security Trust Company, Indianapolis, has been instructed to sell at commissioners' sale, the plant of the United States Cement Company at Bedford, Ind. A minimum price of $115,000 has been set. The bondholders, whose holdings are $225,000, are expected to be bidders.

The Corning Draft Gear Company, Hammond, Ind., has been incorporated with $150,000 capital stock. The company will manufacture iron and steel specialties, devices used by railroads, draft gears, &c. The company's Chicago office is located in the Fisher Building, room 206.

The Dean Forging Company, Muncie, Ind., has issued $100,000 of preferred stock, but advises that it is not contemplating any improvements.

Farther Central West

OMAHA, NEB., January 2, 1911.

Considering merely the trade actually in sight for the midwinter season about to open, there does not seem to be very much of a definite character for dealers to count upon, apart from regular routine custom, but with the quantity of construction work, improvements, &c., planned for the coming spring, a fairly good business at least may reasonably be anticipated.

The Omaha Structural Steel Works, Omaha, Neb., now has under construction at Forty-eighth and Leavenworth streets, a steel frame brick plant, 75 x 288 ft., the equipment for which will be purchased at an early date. A full line of modern fabricating tools, pattern making, blacksmtih work, &c., is required.

The construction of an incineration plant, which it is estimated will cost about $100,000, has recently been taken under consideration by the authorities at Omaha, and action by the Common Council is expected shortly.

The Dodd Steel & Iron Works, Des Moines, Iowa, is to be operated this year by a new company, including G. W. Newell and L. H. Hixon of that city, who have formed a new corporation of considerable financial strength and will be in a position to maintain the business on a very favorable basis. Mr. Newell is an expert in structural work, including the engineering details essential to its successful accomplishment.

A bond issue of $7000 has been voted at Whittemore, Ia., to cover the cost of a municipal pumping plant and water works system.

A portion of the manufacturing plant of the Great Western Cereal Company at Fort Dodge, Ia., has been destroyed by fire and will probably be replaced by more extensive structures, fitted throughout with electric drive.

Bonds have been sold at Corydon, Ia., for the installation of a water works system.

An election is to be held at Cortland, Neb., to decide upon the construction of a municipal pumping plant.

The authorities at Tabor, Ia., are preparing to install pumping machinery to distribute water from a new artesian well.

The city officials at Cheyenne, Wyo., are investigating mechanical filtration systems, with a view to the installation of one there.

The Allen Company, Boulder, Colo., is arranging for the equipment of a new concentrating mill, to be completed by early spring, which will be used for the treatment of tungsten ore.

Funds will be provided early in the coming year at Coggon, Ia., for an electric plant to serve the community, a special tax for the purpose having been voted. The matter of equipment is now under consideration, but no purchase will be made until later.

It is reported from Eldora, Ia., that Lundy & Wood, who are developing the water power there, will build dams at three additional points on the Iowa River, making possible a larger hydro-electric plant at Eldora than was originally intended.

It is proposed at Belle Plaine, Ia., to build a new pumping station on the outskirts of the city and furnish water from additional wells.

The erection of a smelter will be commenced shortly by the Copper Belt Mining Company, Lusk, Wyo., midway between its Copper belt and Michigan mines, the latter having recently been acquired. New steam hoists and air compressors are also to be provided by the company for more extensive development work.

An appropriation has been made at Lovell, Wyo., for the installation of an electric lighting plant.

An electric power and pumping station will be constructed at Atlantic, Ia., where a fund of $50,000 has been set aside for the purpose. The project was delayed for some time and is now to be pushed to completion.

Government Purchases

WASHINGTON, D. C., January 3, 1911.

The Bureau of Supplies and Accounts, Navy Department, Washington, will open bids January 17 for one air compressor, schedule 3236; 18 generator sets, schedule 3832; and 6 sets of gasoline propelling machinery, schedule 3233.

The Paymaster General, Navy Department, Washington, will open bids January 10, under schedule 3187, class 13, for one 2-kw. constant speed motor generator and one 2-kva. open-core wireless telegraph transformer, and under schedule 3208, class 53, for one upsetting bolt heading and forging machine and class 54, for one steam winch.

The Isthmian Canal Commission's canal circular 614, calls for bids to be opened February 25 for machines, motors and limit switches to operate the Stony Gate valves and cylindrical valves for controlling the culverts of the locks at Gatun, Pedro Miguel and Miraflores.

The Bureau of Yards and Docks, Navy Department, Washington, opened bids December 27, as follows:

Schedule 3099, class 1.—For one power pump—Bidder 2, Allis-Chalmers Company, Milwaukee, Wis., $1875; 3, American Steam Pump Company, Battle Creek, Mich., $3870; 26, R. P. Clark Company, Washington, D. C., $2560 and $2470; 39, De Laval Steam Turbine Company, Trenton, N. J., $2310 and $2790; 42, George E. Dow Pumping Engine Company, San Francisco, Cal., $1155, $1305, $1460 and $2245; 65, Henshaw, Bulkley & Co., San Francisco, Cal., $1105; 66, Harron, Ricard & McCone, San Francisco, Cal., $3278; 75, Kenney Mfg. Company, Boston, Mass., $4000; 114, Pratt Iron Works Company, Dayton, Ohio, $1450, $1609, $1500, $1775, $1865, $1575, $2025, $2100, $2075, $3200, $2326 and $2660; 115, Perrine Machinery Company, Seattle, Wash., $1475; 141, United Iron Works, Oakland, Cal., $918; 148, H. F. Worthington, New York, $1350, $1800 and $2100; 156, Byron Jackson Iron Works, San Francisco, Cal., $1500 and $1100.

Class 11.—One No. 2 condenser ferrule machine—Bidder 10, Brown & Sharpe Mfg. Company, Providence, R. I., $1160; 101, Manning, Maxwell & Moore, New York, $2120.

Class 51.—One traveling crane—Bidder 8, Alfred Box & Co., Philadelphia, Pa., $1800; 14, Brown Hoisting Machinery Company, Cleveland, Ohio, $2450; 101, Manning, Maxwell & Moore, New York, $1950; 105, Niles-Bement-Pond Company, New York, $2590; 158, Cleveland Crane & Engineering Company, Wickliffe, Ohio, $1645.

Class 61.—One tool and cutter grinder—Bidder 10, Brown & Sharpe Mfg. Company, Providence, R. I., $815.75; 22, Cincinnati Milling Machine Company, Cincinnati, Ohio, $779.30; 50, Fairbanks Company, Washington, $585; 101, Manning, Maxwell & Moore, New York, $700.

Class 62.—One vertical spindle press—Bidder 78, J. P. Kemp, Baltimore, Md., $793.50 and $918.25.

Fluctuations in the Prices of Iron and Steel Products for Thirteen Years

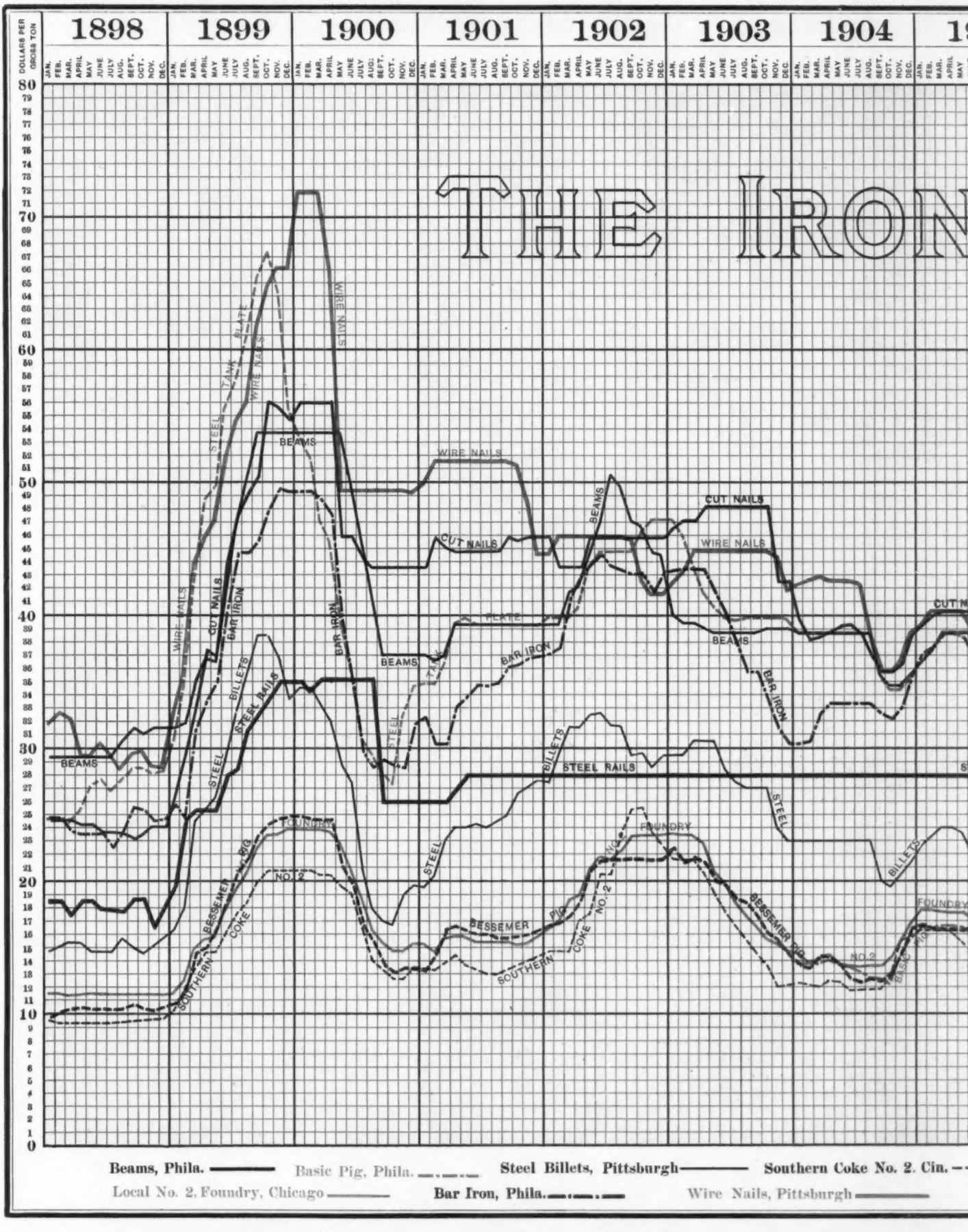
Monthly Averages Computed from the Weekly Market Quotations of "The Iron Age" in the Period 1898–1910

(With Supplement.)

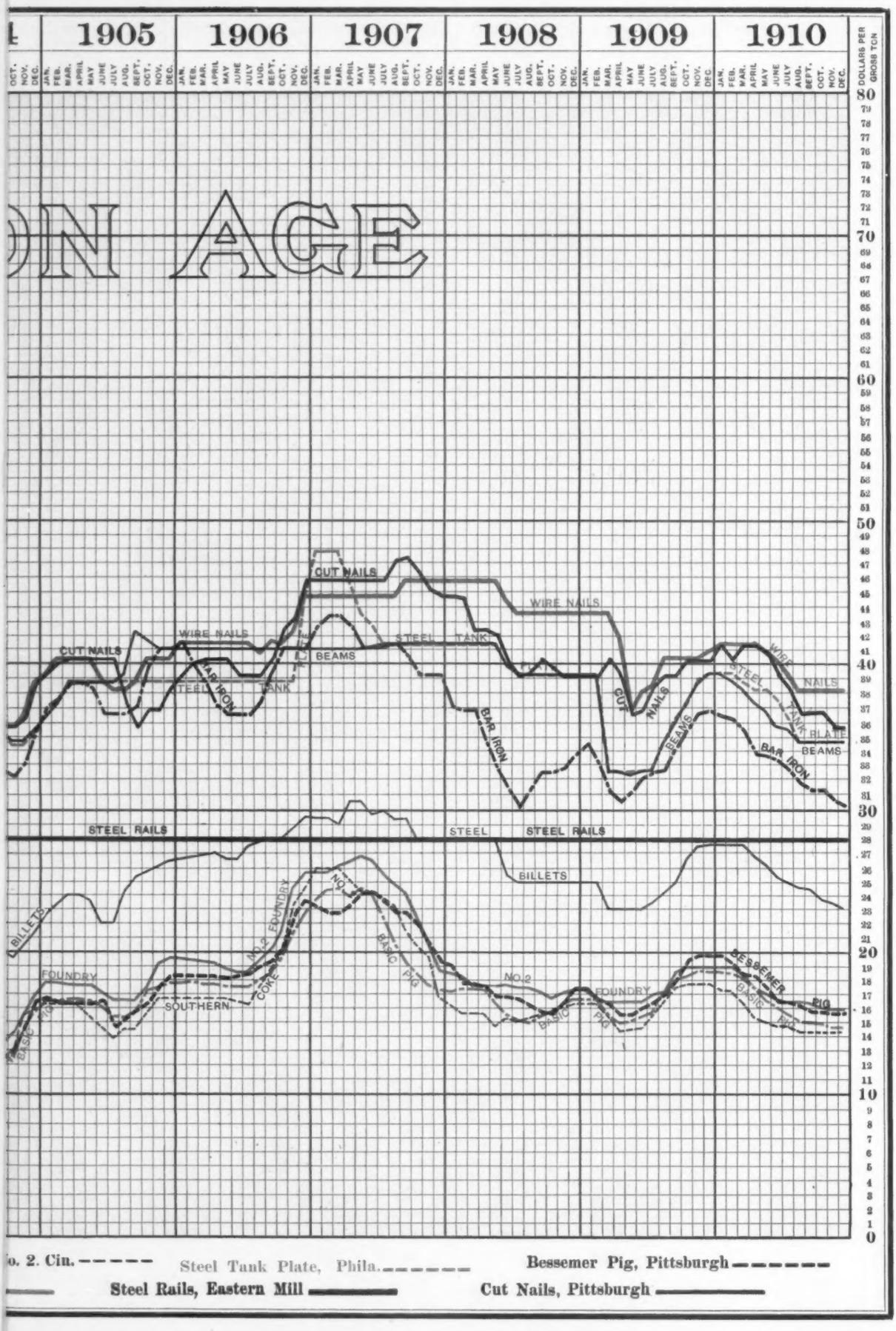
Accompanying this issue of *The Iron Age* is our annual chart, in which lines are plotted to indicate the course of prices for pig iron, Bessemer steel billets and the leading forms of finished iron and steel in the 13 years ending with 1910. The diagrams are based on monthly averages of prices given week by week in our market reports from the leading selling centers. The figures on the margin of the chart stand for dollars and the black, red and blue lines represent prices per gross ton. The table below gives the monthly average prices:

Months.	Bessemer pig, Pittsburgh.	Steel billets, Pittsburgh.	So. No. 2 foundry, Cincinnati.	Local No. 2 foundry, Chicago.	Cut nails, Pittsburgh.	Tank plate, Philadelphia.	Beams, Philadelphia.	Ref'd bar iron, Philadelphia.	Wire nails, Pittsburgh.
1898									
Jan.....	9.87	14.93	9.50	11.35	1.10	1.10	1.30	1.11	1.42
Feb.....	10.05	15.06	9.25	11.28	1.10	1.10	1.30	1.11	1.45
March...	10.39	15.25	9.25	11.10	1.10	1.08	1.30	1.06	1.43
April....	10.41	15.06	9.25	11.26	1.08	1.12	1.30	1.05	1.31
May.....	10.30	14.85	9.37	11.35	1.08	1.21	1.30	1.05	1.31
June....	10.34	14.65	9.30	11.35	1.06	1.23	1.30	1.05	1.35
July.....	10.25	14.50	9.25	11.35	1.06	1.20	1.30	1.00	1.31
Aug.....	10.35	15.85	9.37	11.35	1.05	1.23	1.37	1.06	1.26
Sept.....	10.78	16.00	9.55	11.35	1.08	1.27	1.40	1.14	1.32
Oct.....	10.36	15.56	9.75	11.35	1.10	1.27	1.38	1.13	1.33
Nov.....	10.15	15.06	9.75	11.35	1.10	1.25	1.35	1.10	1.28
Dec.....	10.58	15.80	9.90	11.35	1.10	1.26	1.35	1.11	1.27
1899									
Jan.....	10.87	16.62	10.31	11.47	1.18	1.35	1.40	1.15	1.43
Feb.....	11.60	18.00	11.69	12.47	1.32	1.55	1.42	1.20	1.57
March...	14.59	24.30	13.75	14.95	1.48	1.89	1.55	1.41	1.94
April....	15.03	25.37	14.50	15.47	1.67	2.18	1.64	1.50	2.05
May.....	16.20	26.75	14.56	15.72	1.65	2.23	1.63	1.56	2.10
June....	18.51	30.10	16.00	17.95	1.97	2.48	1.82	1.81	2.30
July.....	20.65	33.12	17.56	19.22	2.12	2.58	2.08	2.00	2.42
Aug.....	21.75	35.40	18.35	20.65	2.20	2.72	2.20	2.00	2.50
Sept.....	23.43	38.37	19.94	22.22	2.45	2.92	2.40	2.05	2.76
Oct.....	24.18	38.75	20.75	23.35	2.50	3.00	2.40	2.13	2.87
Nov.....	24.78	36.50	20.75	23.45	2.48	2.87	2.40	2.21	2.95
Dec.....	24.90	33.75	20.75	23.85	2.45	2.48	2.40	2.20	2.95
1900									
Jan.....	24.99	34.50	20.69	23.85	2.50	2.38	2.40	2.20	3.20
Feb.....	24.80	34.87	20.50	23.85	2.50	2.32	2.40	2.20	3.20
March...	24.72	33.00	20.30	23.85	2.50	2.10	2.40	2.18	3.20
April....	24.70	32.00	20.19	23.72	2.50	2.02	2.40	2.12	2.95
May.....	21.00	28.90	19.75	22.65	2.05	1.75	2.40	1.77	2.20
June....	19.72	27.25	18.75	20.72	2.05	1.60	2.22	1.56	2.20
July.....	16.75	21.00	16.81	18.60	1.97	1.37	2.05	1.33	2.20
Aug.....	15.60	18.20	14.25	16.25	1.95	1.30	1.89	1.28	2.20
Sept.....	13.87	16.93	13.62	15.35	1.95	1.25	1.65	1.30	2.20
Oct.....	13.06	16.50	12.87	14.85	1.95	1.21	1.65	1.28	2.20
Nov.....	13.48	18.95	12.95	14.85	1.95	1.44	1.65	1.28	2.20
Dec.....	13.43	19.75	13.75	15.10	1.95	1.54	1.65	1.42	2.20
1901									
Jan.....	13.15	19.75	13.45	15.10	1.95	1.55	1.65	1.44	2.22
Feb.....	14.43	20.31	13.12	14.60	2.05	1.55	1.63	1.35	2.30
March...	16.31	22.88	14.00	15.60	2.01	1.62	1.66	1.35	2.30
April....	16.75	24.00	14.50	15.85	2.00	1.76	1.75	1.47	2.30
May.....	16.30	24.00	13.85	15.85	2.00	1.78	1.75	1.51	2.30
June....	16.00	24.38	13.37	15.35	2.00	1.75	1.75	1.55	2.30
July.....	16.00	24.00	13.00	15.35	2.00	1.75	1.75	1.55	2.30
Aug.....	15.75	24.20	13.00	15.35	2.00	1.75	1.75	1.56	2.30
Sept.....	15.75	24.88	13.06	15.35	2.05	1.75	1.75	1.61	2.30
Oct.....	15.89	26.70	13.75	15.10	2.04	1.75	1.75	1.62	2.28
Nov.....	16.00	27.00	14.00	15.23	2.05	1.75	1.75	1.64	2.17
Dec.....	16.31	27.50	14.25	15.85	2.05	1.75	1.75	1.65	1.99
1902									
Jan.....	16.70	27.50	14.55	16.25	2.05	1.78	1.75	1.66	1.99
Feb.....	16.93	29.37	14.75	16.85	1.95	1.78	1.75	1.68	2.05
March...	17.37	31.25	14.75	18.51	1.95	1.78	1.85	1.84	2.05
April....	18.75	31.50	16.87	18.97	1.96	1.81	1.90	1.92	2.05
May.....	20.75	32.20	18.35	20.85	2.05	1.95	1.99	1.96	2.05
June....	21.56	32.37	20.19	21.85	2.05	2.00	2.11	1.99	2.05
July.....	21.60	31.75	20.75	21.60	2.05	2.00	2.27	1.95	2.05
Aug.....	21.62	31.06	23.06	22.10	2.05	2.00	2.21	1.93	2.05
Sept.....	21.75	29.50	25.00	23.35	2.05	2.00	2.10	1.92	2.03
Oct.....	21.75	29.70	25.65	23.35	2.05	2.06	2.09	1.93	1.89
Nov.....	21.68	28.50	23.62	23.35	2.05	2.10	2.00	1.87	1.85
Dec.....	21.75	29.12	22.44	23.35	2.05	2.10	1.97	1.92	1.85

Months.	Bessemer pig, Pittsburgh.	Steel billets, Pittsburgh.	Basic pig, Philadelphia.	So. No. 2 foundry, Cincinnati.	Local No. 2 foundry, Chicago.	Cut nails, Pittsburgh.	Tank plate, Philadelphia.	Beams, Philadelphia.	Ref'd bar iron, Philadelphia.	Wire nails, Pittsburgh.
1903										
Jan...	22.15	29.60	....	21.65	23.45	2.07	2.10	1.78	1.93	1.89
Feb...	21.45	29.87	....	21.50	23.35	2.10	2.05	1.75	1.93	1.92
Mar...	21.85	30.62	....	21.37	23.22	2.10	1.94	1.75	1.94	2.00
April..	21.28	30.25	....	20.15	22.87	2.15	1.85	1.74	1.93	2.00
May...	20.01	30.37	....	18.87	20.72	2.15	1.80	1.73	1.86	2.00
June..	19.72	28.87	....	17.75	19.85	2.15	1.78	1.73	1.79	2.00
July...	18.89	27.60	....	16.15	18.25	2.15	1.77	1.73	1.69	2.00
Aug...	18.35	27.00	....	15.19	17.22	2.15	1.78	1.73	1.60	2.00
Sept...	17.22	27.00	....	14.75	16.41	2.15	1.78	1.73	1.60	2.00
Oct...	16.05	27.00	....	13.50	15.70	2.15	1.78	1.73	1.50	2.00
Nov...	15.18	24.00	....	12.00	15.10	1.90	1.78	1.73	1.40	1.97
Dec...	14.40	23.00	....	12.05	14.81	1.90	1.77	1.73	1.35	1.87
1904										
Jan...	13.91	23.00	13.90	12.37	14.47	1.77	1.73	1.73	1.35	1.89
Feb...	13.66	23.00	13.73	12.12	13.91	1.70	1.73	1.73	1.36	1.90
Mar...	14.25	23.00	13.78	12.10	14.05	1.72	1.73	1.73	1.45	1.91
April..	14.18	23.00	14.00	12.50	14.35	1.74	1.73	1.73	1.48	1.90
May...	13.60	23.00	13.81	12.25	13.85	1.75	1.73	1.73	1.48	1.90
June..	12.81	23.00	13.53	11.80	13.70	1.75	1.73	1.73	1.48	1.90
July...	12.40	23.00	13.04	11.81	13.60	1.72	1.73	1.73	1.48	1.89
Aug...	12.81	23.00	12.81	12.00	13.60	1.65	1.73	1.73	1.48	1.71
Sept...	12.63	20.00	12.73	12.00	13.85	1.60	1.57	1.57	1.45	1.60
Oct...	13.10	19.50	13.21	12.81	14.10	1.60	1.53	1.53	1.43	1.60
Nov...	14.85	20.25	14.56	15.19	15.98	1.62	1.53	1.53	1.47	1.62
Dec...	16.65	21.20	15.75	15.85	16.95	1.73	1.57	1.57	1.60	1.73
1905										
Jan...	16.85	22.75	16.50	16.25	17.85	1.75	1.63	1.63	1.65	1.75
Feb...	16.41	23.50	16.50	16.25	17.85	1.79	1.66	1.66	1.68	1.80
Mar...	16.35	24.00	16.69	16.25	17.80	1.80	1.73	1.73	1.73	1.80
April..	16.35	24.00	16.75	16.25	17.60	1.80	1.73	1.73	1.73	1.80
May...	16.16	23.50	16.56	15.81	17.60	1.80	1.73	1.73	1.71	1.80
June..	16.65	22.00	16.00	14.65	17.00	1.80	1.73	1.73	1.63	1.74
July...	14.85	22.00	15.33	13.94	16.47	1.80	1.73	1.73	1.63	1.70
Aug...	15.20	24.00	15.15	14.40	16.60	1.66	1.73	1.76	1.63	1.70
Sept...	15.91	25.00	15.81	14.37	16.60	1.60	1.73	1.88	1.66	1.74
Oct...	16.54	25.62	17.19	15.31	17.66	1.65	1.73	1.87	1.78	1.80
Nov...	17.85	26.00	17.55	16.60	19.15	1.65	1.73	1.83	1.83	1.80
Dec...	18.35	26.00	17.81	16.75	19.60	1.71	1.73	1.83	1.83	1.80
1906										
Jan...	18.35	26.25	17.89	16.75	19.60	1.75	1.73	1.83	1.86	1.85
Feb...	18.35	26.50	17.89	16.75	19.41	1.79	1.73	1.83	1.78	1.85
Mar...	18.28	26.70	17.81	16.65	19.35	1.80	1.73	1.83	1.73	1.85
April..	18.19	27.00	17.86	16.63	19.10	1.80	1.73	1.83	1.66	1.85
May...	18.10	26.40	17.59	16.75	18.90	1.80	1.73	1.83	1.63	1.85
June..	18.23	26.63	17.58	16.44	18.54	1.75	1.73	1.83	1.63	1.85
July...	18.41	27.25	17.58	16.06	18.60	1.75	1.73	1.83	1.63	1.84
Aug...	19.00	27.80	18.02	17.30	19.45	1.75	1.73	1.83	1.67	1.82
Sept...	19.54	28.00	18.56	18.69	20.16	1.80	1.73	1.83	1.76	1.86
Oct...	20.35	28.00	19.56	20.00	21.48	1.90	1.73	1.83	1.83	1.85
Nov...	22.85	28.88	21.15	23.38	24.70	1.93	1.73	1.83	1.83	1.88
Dec...	23.75	29.50	22.75	25.00	25.85	2.05	1.99	1.83	1.83	2.00
1907										
Jan...	23.15	29.40	23.70	26.00	25.85	2.05	2.13	1.83	1.91	2.00
Feb...	22.85	29.50	24.38	26.00	25.85	2.05	2.13	1.83	1.93	2.00
Mar...	22.85	29.00	24.44	26.00	26.10	2.05	2.13	1.83	1.93	2.00
April..	23.35	30.12	24.00	25.06	26.35	2.05	2.03	1.83	1.91	2.00
May...	24.01	30.30	24.65	24.25	26.85	2.05	1.94	1.83	1.83	2.00
June..	24.27	29.62	24.06	24.10	26.60	2.05	1.91	1.84	1.83	2.00
July...	23.55	30.00	22.33	22.85	25.55	2.05	1.85	1.85	1.84	2.00
Aug...	22.90	29.25	20.65	23.00	24.85	2.10	1.85	1.85	1.85	2.00
Sept...	22.90	29.37	19.09	21.50	24.10	2.11	1.85	1.85	1.81	2.05
Oct...	22.00	28.20	18.40	20.95	22.45	2.07	1.85	1.85	1.75	2.05
Nov...	20.65	28.00	17.81	19.50	20.66	2.01	1.85	1.85	1.75	2.05
Dec...	19.34	28.00	17.38	17.00	18.80	2.00	1.85	1.85	1.75	2.05
1908										
Jan...	19.00	28.00	17.10	16.15	18.45	2.00	1.85	1.85	1.65	2.05
Feb...	17.90	28.00	17.25	15.75	18.16	2.00	1.85	1.85	1.65	2.05
Mar...	17.86	28.00	17.25	15.50	17.85	1.90	1.85	1.85	1.65	2.05
April..	17.49	28.00	17.25	15.20	17.73	1.90	1.85	1.85	1.55	2.05
May...	16.93	28.00	16.38	14.75	17.63	1.89	1.85	1.85	1.45	2.05
June..	16.90	25.75	15.50	15.25	17.73	1.79	1.78	1.78	1.40	1.97
July...	16.83	25.00	15.10	15.00	17.55	1.75	1.75	1.75	1.35	1.95
Aug...	16.23	25.00	15.00	15.25	17.35	1.76	1.75	1.75	1.40	1.95
Sept...	15.90	25.00	15.44	15.65	17.05	1.80	1.75	1.75	1.45	1.95
Oct...	15.71	25.00	15.80	15.75	16.85	1.77	1.75	1.75	1.45	1.95
Nov...	16.59	25.00	16.19	16.00	17.10	1.75	1.75	1.75	1.47	1.95
Dec...	17.40	25.00	16.70	16.25	17.35	1.75	1.75	1.75	1.51	1.95



Fluctuations in the Prices of Crude an
from January 1, 1898, to January



le and Finished Iron and Steel
uary 1, 1911—Gross Tons.

Months.	Bessemer pig, Pittsburgh.	Steel billets, Pittsburgh.	Basic pig, Philadelphia.	So. No. 2 foundry, Cincinnati.	Local No. 2 foundry, Chicago.	Cut nails, Pittsburgh.	Tank plate, Philadelphia.	Beams, Philadelphia.	Ref'd bar iron, Philadelphia.	Wire nails, Pittsburgh.
1909										
Jan...	17.34	25.00	16.75	16.25	17.35	1.75	1.75	1.75	1.54	1.95
Feb...	16.78	25.00	16.56	16.13	16.75	1.75	1.75	1.75	1.48	1.95
Mar...	16.25	23.00	15.60	15.05	16.50	1.80	1.45	1.45	1.39	1.95
April..	15.78	23.00	15.00	14.25	16.50	1.75	1.45	1.45	1.36	1.87
May...	15.84	23.00	15.13	14.50	16.50	1.64	1.45	1.43	1.39	1.65
June..	16.05	23.00	15.50	14.70	16.50	1.65	1.45	1.45	1.43	1.70
July...	16.46	23.50	15.88	15.75	17.00	1.71	1.46	1.46	1.45	1.72
Aug...	17.03	24.13	17.06	16.38	17.13	1.75	1.55	1.55	1.45	1.80
Sept..	18.05	25.00	18.13	17.35	18.70	1.75	1.62	1.61	1.52	1.80
Oct...	19.53	26.25	18.38	17.88	19.00	1.80	1.66	1.66	1.58	1.80
Nov...	19.90	27.13	18.75	17.75	19.00	1.80	1.74	1.74	1.64	1.80
Dec...	19.90	27.50	18.75	17.45	19.00	1.80	1.75	1.75	1.65	1.85
1910										
Jan...	19.90	27.50	18.75	17.25	19.00	1.85	1.75	1.75	1.62	1.85
Feb...	19.34	27.50	18.56	17.06	19.00	1.80	1.75	1.74	1.61	1.85
Mar...	18.60	27.50	18.25	16.30	18.30	1.85	1.73	1.70	1.57	1.85
April..	18.27	26.75	17.56	15.37	17.50	1.85	1.70	1.66	1.51	1.85
May...	17.52	26.12	16.69	15.00	17.06	1.82	1.70	1.65	1.50	1.82
June..	16.60	25.30	16.10	14.85	16.75	1.75	1.67	1.60	1.49	1.80
July...	16.40	25.00	15.68	14.75	16.56	1.70	1.61	1.59	1.46	1.75
Aug...	16.09	24.62	15.12	14.31	16.50	1.65	1.55	1.55	1.42	1.70
Sept..	15.90	24.40	15.00	14.25	16.40	1.65	1.55	1.55	1.40	1.70
Oct...	15.90	23.75	15.00	14.25	16.06	1.65	1.55	1.55	1.40	1.70
Nov...	15.82	23.30	14.75	14.25	16.00	1.60	1.55	1.55	1.37	1.70
Dec...	15.90	23.00	14.75	14.25	16.00	1.60	1.55	1.55	1.34	1.70

In plotting the lines, those representing finished material have been derived by multiplying the market prices of finished material per pound by 2240, so that the traversing lines would show the exact price relation between gross tons of all products. In the table above, however, while pig iron and steel billet prices are in dollars per gross ton, those for finished material are stated in the usual way—namely, in cents per pound. In the case of local No. 2 foundry iron, Chicago, the prices given are f.o.b. Chicago district foundries, a 35-cent switching charge having been added to the prices at furnaces in that district.

The prices used in plotting the curves are in all cases those for early delivery. The 13 years are a most interesting period in the iron trade of the country, beginning with 1898, the year in which the depression following the panic of 1893 produced its culminating effect upon iron and steel prices. The rapid advances of 1899 give a remarkable peak, which is the spectacular feature of the chart. Almost equally noteworthy are the declines of 1900. In 1901 prices were fairly steady, with advances in the latter part of the year, bringing another series of high points in 1902, though these are moderate in comparison with 1899. The sharp decline of 1903 is distinctly shown; the slight further decline extending over nine months of 1904, with advances in the latter part of the year; some reaction in 1905, followed by advances in the latter part of the year and a comparatively stable level for the first half of 1906. Then came a strong movement upward, carrying prices to substantially the levels of 1902, followed by recessions after the middle of 1907. The price maintenance movement modified the decline in the depression of 1908, and in the spring of 1909 came some abrupt declines, which stimulated buying and gave the strong upward curve of the second half of 1909. In general, 1910 was a year in which the price movement reversed that of 1909, pig iron reaching again its low points of 1909, while finished materials only retraced part of the distance to the bottom touched after the open market declaration of February, 1909.

The United Engineering & Foundry Company Buys Another Plant.—A deal for the sale of the plant of the American Roll & Foundry Company, Canton, Ohio, to the United Engineering & Foundry Company, Pittsburgh, has been consummated, and the Canton plant will hereafter be operated as a branch plant, with no change in the local management.

Agreements have been signed by the Erie Railroad Company and the Grade Crossing Commission of Buffalo for the elimination of a number of grade crossings in the northern part of the city, the cost of which will be considerably over $1,000,000, and involve the use of a large tonnage of structural steel.

The British Iron Trade in 1910

From the annual review of Bolling & Lowe, London, the following extracts are taken:

A decided improvement on 1909 and a general advance in prices in many directions sums up the record of the position of trade for the year now drawing to a close. The progress, however, has been intermittent, and a suspension has several times occurred. At no time was the improvement in the nature of a boom, but at the commencement of the year various increases in prices occurred, which were regarded as signs of a general move forward. In the early summer, however, there was a marked cessation of activity, although prices remained fairly firm. . . . It is fair to assume that a very much brighter condition of things would have resulted but for the strikes which have thrown such a gloom over the commercial world. It may be incidentally remarked that these strikes have by no means been limited to the United Kingdom, as witness the prolonged Bilbao strike, which dislocated the Spanish ore trade. In the North of England, however, and in South Wales, a stubborn war has been waged, and the singular resistance to any influence from the trade union leaders toward conciliatory measures becomes an increasing danger in these labor troubles.

The railroad companies bear testimony to the more prosperous condition and many of the manufacturers are doing well, having plenty of orders on their books for some time to come. In October it was stated that Scotch steel makers had booked over 200,000 tons for delivery over a year, and although much of this was taken under current prices it nevertheless showed signs of a healthy condition. At that period several advances took place and an abnormal demand had set in for sheets and plates for all purposes.

We have, however, sustained a setback in one direction. For the first time we have allowed ourselves to be outstripped by Germany in the quantity of steel exported, and however sanguine we may be that a reversal of this is probable, the difficulty of regaining ground once lost is universally conceded.

The pig iron market has kept fairly steady during the past year, prices having varied little more than 2 shillings 6 pence per ton over the whole of this period. We look for an advance, now that the strike in the North is settled.

There is little to record in rails, and that little by no means cheerful. This section of the trade has been remarkably quiet, and there has been a great falling off in the tonnage exported. Prices have undergone little variation and there has been a singular dearth of orders. A greater evil, however, than want of business or labor disputes seems to threaten not so much the existence of the syndicate as its prosperity, through the increasing growth of competitors who may snatch away important customers with every likelihood of retaining them. The Hanyang Works at Hankow, the Lithgow Works in New South Wales and the Kalimati Steel & Iron Works of India have joined the ranks of producers, and will no doubt meet with plenty of local encouragement, and we may add to this the important Dominion Iron & Steel Company.

Galvanized sheets have also shared in the prosperity, although prices have kept fairly equable. To the end of November 548,060 tons were exported, against 441,455 tons for the same period in 1909. The exports to India were nearly 40 per cent. over those of 1909.

This year there has existed in South Wales a condition of trade in tin plates almost equal to a boom. An unprecedented amount of buying has taken place, owing to enormous developments in the canning trades of the world.

The Weller Hardware & Foundry Company, Horseheads, N. Y., has been incorporated under the laws of the State of New York, to take over and continue the business of an existing firm of the same name. Horace J. Weller is president, Frank L. Matthews vice-president, William W. Myers secretary and H. J. Weller treasurer.

Concrete Shafts of Record Size

The Section Thirty Mine—Menominee Range Activity

MARQUETTE, MICH., December 31, 1910.—What is declared to be the largest concrete mining shaft ever constructed has been completed at Hibbing by the New York Foundation Company. It was sunk for the Tod-Stambaugh Company at its Morton mine, which it is expected will develop into one of the largest underground shippers on the Mesaba range. The walls are 4 ft. thick and the inside diameter is 21 ft. The shaft is bottomed at 185 ft. Work was begun over a year and a half ago. It took nearly three months to sink the last 9 ft. Since commencing operations at the Morton property the New York Foundation Company has completed shafts of similar kind at the Scranton mine at Hibbing, the Woodbridge at Bhul, the North American at Tower, the Hill mine at Marble and one at Deerwood, on the Cuyuna range, in addition to the shaft it has sunk or is sinking in the Marquette and Swanzey districts. At the Morton mine drifts will be run at once, and it is expected that it will be a prominent shipper next season. The Tod-Stambaugh Company has a fine machine shop at the mine, as well as a modern office building and a considerable village of cottages, and it is well equipped for operations on an extensive scale.

The Section Thirty Mining Company, operating the famous section 30 property on the Vermilion range, will ship 225,000 tons of ore in 1911, its second year, as compared with 52,000 tons last season. An Eastern furnace company has contracted to take the season's output, which is estimated at this time at the amount mentioned. The company is hoisting 500 tons a day and it is figured that there will be 125,000 tons in stock at the opening of navigation. A fine quality of ore is produced. Recent assays have averaged 67.40 per cent. in metallic iron. Work underground is being pushed vigorously. At the present time 230 men are employed. G. A. St. Clair and Alfred Merritt of Duluth control the Section Thirty Company, and the fee owners are Lon Merritt, R. H. Fagan, L. C. Harris, the Eaton Estate of Duluth and George J. Lonstorf of Milwaukee.

The stripping of the Longyear property at Hibbing, a contract for which is about to be awarded by the Jones & Laughlin Steel Company, will require fully two years to complete. The tract consists of 80 acres. Directly to the east is the Nassau property, also a possession of the Jones & Laughlin interests, having been purchased from the Pittsburg Iron Ore Company a few months ago. The two tracts combined would make a large mine, but it is understood that the stripping contemplated does not at this time include the Nassau. The Nassau is listed by the State Tax Commission as containing 4,000,000 tons of ore. The Longyear is listed at 3,000,000 tons.

Oglebay, Norton & Co. are to sink a big, new shaft at their Bristol mine, at Crystal Falls, Menominee range. It will be located on the north side of the property and close to the banks of Briar Hill Creek. It will be of four compartments, 6½ x 22 ft. inside of timbers, and will contain two skipways, a cageway and a ladder and pipe compartment. The shaft will extend to a depth of 1000 ft., or to the bottom of the present workings. The work will be done by one gang sinking from surface and two gangs raising from different points underground. By this arrangement it is expected that the shaft will be speedily finished and will be of some use the coming season. The Bristol is a large property and has been a heavy producer and a valuable one to its owners.

In the past few years no district in the Lake Superior iron region, the Mesaba country alone excepted, has witnessed greater development than that in the Iron River field at the western end of the Menominee range. It was not so long ago that mining in that territory was confined to a small area along the banks of Iron River. Now the operations extend over a wide radius and are steadily being expanded. The mining companies at work in the district have increased from less than half a dozen to more than twice that number, and the annual output has grown to upwards of 1,000,000 tons. There were 11 shippers on the list the past season—the Baker, Baltic, Berkshire, Caspian, Chatham, Dober, Fogarty, Hiawatha, James, Youngs and Zimmermann. There will be at least four more the present year and still others in 1912.

New Railroad Construction and Equipment

The annual statistics of the *Railway Age-Gazette* show that new railroad built in 1910 was 4122 miles of main line, as compared with 3748 miles in 1909. In Canada new construction amounted to 1844 miles, as compared with 1488 miles in 1909, and in Mexico reports show 138 miles in 1910 and 281 miles in 1909. The mileage built in the United States in the past 18 years is as follows:

1893.....3,024	1899.....4,569	1905.....4,388
1894.....1,760	1900.....4,894	1906.....5,623
1895.....1,428	1901.....5,368	1907.....5,212
1896.....1,692	1902.....6,026	1908.....3,214
1897.....2,109	1903.....5,652	1909.....3,748
1898.....3,265	1904.....3,832	1910.....4,122

Cars and Locomotives Built and Ordered

The same journal gives each year statistics of cars and locomotives built in the preceding 12 months and also of cars and locomotives ordered. The reports of new cars built last year in the United States and Canada show a total of 185,357, as compared with 96,419 in 1909. The total of locomotives built in the United States and Canada was 4755 in 1910, against 2887 in 1909. The record of cars built in the past 12 years is as follows. It will be noticed that the total for 1910 was more than for 1909 and 1908 together:

Year.	Freight.	Passenger.	Total cars built.
1899	119,886	1,305	121,191
1900	115,631	1,636	117,267
1901	136,950	2,055	139,005
1902	162,599	1,948	164,547
1903	153,195	2,007	155,202
1904	60,806	2,144	62,950
1905*	165,155	2,551	168,006
1906*	240,503	3,167	243,670
1907*	284,188	5,457	289,645
1908*	76,555	1,716	78,271
1909*	93,570	2,849	96,419
1910*	180,945	4,412	185,357

* Includes Canadian output.

The figures for locomotive construction in the past 18 years are given in the table below:

Year.	No. built.	Year	No. built.	Year.	No. built.
1893	2,011	1899	2,475	1905*	5,491
1894	695	1900	2,475	1906*	6,952
1895	1,101	1901	3,384	1907*	7,362
1896	1,175	1902	4,070	1908*	2,342
1897	1,251	1903	5,152	1909*	2,887
1898	1,875	1904	3,441	1910*	4,755

* Includes Canadian output.

The record of cars and locomotives ordered last year is much less favorable than that of cars and locomotives built. The new car orders were considerably less than in 1909 and very much below the unprecedented records made in 1905 and 1906. For the past 10 years the tabulated statement of new cars and locomotive orders is as follows:

Year.	Locomotives ordered.	Cars ordered. Passenger.	Cars ordered. Freight.
1901	4,340	2,879	193,439
1902	4,665	3,459	195,248
1903	3,283	2,310	108,936
1904	2,538	2,213	136,561
1905	6,265	3,289	341,315
1906	5,642	3,402	310,315
1907	3,482	1,791	151,711
1908	1,182	1,319	62,669
1909	3,350	4,514	189,360
1910	3,787	3,881	141,204

The Canadian Pacific Railway Company, in its new shops, has been boring up to 35 car wheels per day per machine in its latest type boring mills. After equipping them with Davis expansion boring tools with micrometer adjustment, the output of each mill was increased to 119 wheels per day of 10 hours.

Railroad Repair Shop Efficiency

Great Variations Shown in Shop Costs of Different Companies

BY MAX H. C. BROMBACHER, NEW YORK.

At the late hearing before the Interstate Commerce Commission relative to the proposed advance in freight rates by the railroads, the latter were asked December 9 to furnish the commission with their piecework prices, or cost to them, of several operations which are continually being carried on their repair shops in respect to locomotives. These operations are not isolated ones, occurring infrequently, but virtually the same kind of work is being carried on, day in and day out, in every railroad shop in the country. Practically none of the answers came in before the hearing closed, and not all of the answers are in at this time. But the answers as they came in are, so far as they relate to the questions asked, embraced in about 17, and I have endeavored, in the accompanying table, to put them, as far as possible, on an even basis. Information was sent in which the questions asked did not call for, and in other instances information asked for was not sent in. I have tabulated the questions and the answers, which embrace nine railroad shops in all.

Some Comparisons of the Figures Received

Neither time nor space permits at this writing anything like a thorough analysis of the contents of the tabulation; suffice it to say that the figures speak for themselves. Even a cursory glance at them discloses that shop No. 1 is the lowest of the nine shops in respect of operations Nos. 3, 4, 9, 10, 13, 14, 15 and 17—eight in all—and that it breaks even in respect to the lowest on operations Nos. 6 and 7 and is highest on none of the 17 operations; that shop No. 2 is lowest on operation No. 5; that shop No. 3 is lowest on operation No. 11 and highest on operation No. 14, and that it breaks even in respect to the highest on operation No. 16; that shop No. 4 is lowest on operation No. 1 and breaks even in respect to the highest on operation No. 16; that shops No. 5 is lowest on operation No. 8 and breaks even in respect to the highest on operation No. 16, but breaks even on operation No. 12 in respect to the lowest cost; that shop No. 6 is lowest on operation No. 16, breaks even in respect to the lowest cost on operation No. 12, but is highest on operation No. 1; that shop No. 7 is lowest on no operation, but is highest on operations Nos. 2, 3, 12 and 15; that shop No. 8 is lowest on no operation and highest on operations Nos. 7, 9, 10 and 17; that shop No. 9 is lowest on nothing, breaks even in respect to the lowest on operation No. 6 and is highest in operations Nos. 2, 3 and 4. Perhaps the tabulation immediately below will make the relative status of the nine shops more clear. The numbers on the horizontal line represent the nine shops; the numbers in the perpendicular column represent the first four operations, as shown in the answers. Now shop No. 4 is lowest on operation No. 1, so a 1 is placed immediately under the shop number; shop No. 1 is second lowest, so a 2 is placed immediately under shop No. 1, and as shop No. 6 is highest on operation No. 1, a 9 is placed immediately under its number, as that shop is ninth in order of cost on that operation. This will make the tabulation clear:

Operation.	Shop No. 1	Shop No. 2	Shop No. 3	Shop No. 4	Shop No. 5	Shop No. 6	Shop No. 7	Shop No. 8	Shop No. 9
No. 1.....	2	3	7	1	4	9	8	6	5
No. 2.....	3	5	4	2	1	7	6	8	9
No. 3.....	1	5	4	2	3	8	7	6	9
No. 4.....	1	4	7.5	7.5	2	5	6	3	2
Totals....	7	17	22.5	12.5	10	29	27	23	52

By dividing the total of shop No. 1 into the total of any of the shops, it will be found how much more efficient is that shop. For instance, shop No. 1 is 143 per cent. more efficient than its nearest competitor, shop No. 5, and 457 per cent. more efficient than its furthest competitor, shop No. 9.

Shop No. 1 is evidently the most efficient of the nine on this showing, with its record of eight lowest costs, no higher cost, and an even break in respect of lowest costs on two operations. When I use the phrase "most efficient" here I have reference to lowest costs. The visible sign of efficiency in the real sense is that shop which gets its output at lowest cost to itself and with highest earnings of its operators per hour per month, compared with its competitors. The competitors in the case at hand would be the other eight shops. In the absense of any information as to wages earned per hour per month at the prices which these nine shops pay, we cannot get a line on the "real efficiency," comparatively speaking, of shop No. 1 to the other eight shops. It is to be regretted that the Interstate Commerce Commission did not accompany its questions for prices with a request for the earnings per hour per month of the operators at the prices named by the nine shops. It would have been most interesting to have been in position to trace whether the operators in the shops which paid the highest prices earned the highest rate per hour per month; and, on the other hand, to see if the operators in the shops which paid the lowest prices earned the lowest rate per hour per month. The percentage of difference between th cost of a given operation between certain of the shops is startling, but if we had the rate per hour per month earned by the operators before us I think that the showing would be still more startling. By and large, I think it would show that the operators in shops whose costs were highest earned less per hour per month than those in tne shops whose costs were lowest.

Lack of Some Desirable Data

There are two other questions concerning the data furnished by railroad shops, the answers to which would be illumining as well as educational. One question is, in how many of the railroad shops is the accounting department supreme in respect of this matter of shop cost? I am not implying that any accounting department formulates, initially at least, the piece work schedule. My reference is to that department's requiring all data to be sent to it in detail, right from the inspector's hands and to the department's retaining custody thereafter of the data both in detailed as well as in tabulated form. It is a fact that such a rule is in effect the custom in some shops, and that this rule does not apply in other shops is also a fact. My observation of its workings satisfy me that it almost invariably tends to an amplification of detail, which is both unnecessary as well as expensive, and, what is of infinitely greater importance, that it inevitably tends toward keeping from the shop head that knowledge which, to a shop head desirous of obtaining results, is as necessary as is a chart to a navigator of a vessel. I am aware that in theory this knowledge is accessible to a shop head; if he asks for it he will receive it—some day, perhaps. I am also aware that by the time it reaches him it is quite likely to be of only mortuary interest. The navigator needs a chart before his vessel goes on the rocks, not after; the chart is of only mortuary interest to the navigator after his vessel has gone on the rocks; and a shop head, be he master mechanic or be he general foreman, is a very real navigator in more senses than one.

The other question is, in how many of these railroad shops is the head of the road in question afflicted with the college degree microbe? There is an idea prevalent among railroad men that on certain roads the lack of a college degree operates as a dead line in respect of any position carrying a salary or earnings of more than $100 per month. This alleged rule is said to apply to the shop department of railroads; it does not apply to the operating department. The inherent humor of this rule

does not become fully apparent until one considers that the road suspected of being afflicted with this college degree microbe in its most virulent form in respect of its shops boasts of and ascribes the high efficiency of its operating department to the fact that the heads of that department have almost invariably evoluted from the very practical kindergarten of track walking; that its shop costs are in very many cases comparatively very high is doubtless due to nothing more than what the late lamented Lord Dundreary would describe as "a demnition co-incidence." I am no decrier of a technical education, but its acquirements should be preceded by the acquirement of practice. That this would result, perhaps, in not turning a young man loose on an unguarded public until he bears some real semblance to what his degree purports to brand him as is no valid objection; nor is the possibility that he might have to get his technical education at night any more valid as an objection. I am satisfied from observation that some of the high prices and some of the extreme differences in percentages shown in the tabulation could be traced to these two causes: First, the accounting department's practical supremacy, and, second, the technical belief in the virtues of a technical college degree.

The Railroad Explanation

It has been claimed by the railroads that their repair shops are not fairly comparable by the same standards as private shops; that, unlike the latter, they are not constantly duplicating the same thing. But, as a matter of fact, they are practically doing about the same thing day in and day out; their very piece work schedules and system indicate that. Obviously, a piece work system must be based upon the continual recurrence of the same kind of work. And the fact that on one operation several of the shops have the identical price, and that on another operation two of the shops are less than 2 per cent. apart, seems to indicate that the claimed impossibility of standardizing their work has no substantial foundation in fact; certainly the fact that from a difference of less than 2 per cent. between some of the shops on one operation the divergence grows to a difference of 500 per cent. on another operation is hardly conclusive proof of the impossibility of standardizing their work.

What these wide differences do show, and very conclusively at that, is that Messrs. Brandeis and Emerson would certainly have their work cut out for them in attempting to introduce their scientific methods into railroad repair shops; that their methods are susceptible of application to railroad work is shown by the *Railway Age's* report of their own investigation in December, 1907. This investigation eliminates the Atchison, Topeka & Santa Fé case as being a matter of "Mr. Emerson's claims," if he ever made any, and I never heard that he claimed anything except having acted in an advisory character in that case.

I now come to a consideration of the question as to whether it is not asking the impossible to demand of the railroads that they evolute, suddenly, from their present methods to the "hights of scientific management" at one jump, so to speak. Theoretically it might be done; it has evidently been done in the case of the Atchison, Topeka & Santa Fé, but it "did not stay done," whereas it "does stay done" in the case of private shops. But with them the *leit motif* is both different and more impelling; railroads have not the ever present goad of competition as a stimulant, as up to now they have had it easy.

No one knows much better than I how large a figure the railroads cut in our nation's activities, but I think that a stop should be put to what Mr. Brandeis so felicitously called "the vicious cycle" of ever increasing prices. We must get back to sound economics sometime, and many think that the interruption to that process which started in 1907 was not an unmixed blessing. The force of example is great, and the example of the railroads conforming to sound economics would be immense in its effect on the country. My tabulation, incomplete as it is, shows that some railroads run their repair shops much more efficiently than the others. Why should not the Interstate Commerce Commission require railroad management in general to measure up to the efficiency of the best of them as a condition precedent to raising rates? What one can do, others can do.

Suggestions Compatible With Sound Economics

If the amount to be obtained by all the roads measuring up to about the efficiency of the best managed road about equaled the aggregate of the proposed increase of freight rates, then refuse to grant the increase; something must be allowed by the railroads for the annual growth of traffic. If, on the other hand, the saving to be obtained by enforcing on the roads their measuring up to about the efficiency of the best managed road still left the railroads short of the income necessary to pay 6 per cent. dividends and a liberal allowance for maintenance, renewals, &c., plus a surplus, give them such an increase in rates as would insure them these requisites. Something has been said about the necessity of increasing the confidence of foreign bankers in our railroads by increasing rates; nothing has been said about increasing the confidence of foreign bankers in our railroads by improving the management and exhausting the possibilities of economies in repair shops, &c., and yet I think there is something to be said on this score. Certainly it goes without saying that, if the Interstate Commerce Commission insists upon knowing the facts, and insists upon the railroads measuring up at least approximately to the best among them as a condition precedent to any increase of rates, the result cannot be other than to increase the confidence of foreign bankers in the securities of our roads; the very disposition on the part of the commission to stop the vicious cycle of increasing prices, if at all possible, would raise us and our securities in the estimation of foreign peoples and bankers; it has not invariably been our practice to stick to sound principles either in respect to economics or banking.

Operations for Which Piece Work Prices Were Asked and the Answers Received from Nine Railroads, Designated by Numbers.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.
1. Re-turning locomotive tires (68 in. in diameter), per pair	$0.64	$0.65	$1.40	$0.50	$0.75	$2.20	$1.62	$1.25	$1.10
2. Turning locomotive axles (10 in. in diameter), without wheel-fit, each	1.00	1.80	1.20	.85	.80	2.05	2.00	2.17	5.00
3. Turning locomotive axles (10 in. in diameter), with wheel-fit, each	1.26	2.40	1.80	1.45	1.48	2.80	2.67	2.56	6.00
4. Turning car axles (5½ x 10 in. journals), with wheel-fit, each	.26	.34	.50	.50	.28	.45	.48	.32	.80
5. Boring cast iron car wheels, per pair	.04	.03	.07	.05	...	.06	.065	.04	.05
6. Boring steel car wheels, per pair	.07	...	...	...	...	.10	.095	...	.07
7. Boring cylinders (26-in. stroke), two cuts, per cylinder	1.45	1.60	2.75	2.50	...	1.45	2.72	4.15	*
8. Planing (or milling) new shoes and wedges, each	.28	.41	.30	.20	.18	.20	.27	.34	*
9. Planing cast iron driving boxes (shoe and wedge fit), each	.64	...	...	...	...	1.95	.895	2.825	*
10. Planing steel driving boxes (shoe and wedge fit), each.	.95	1.80	1.30	1.45	1.40	2.17	1.31	3.81	*
11. Machine work on driving box brasses (for box fit), each	.11	.48	.10	.13	.13	.12	.29	.30	*
12. Straightening old piston rods, each	.30	.30	...	...	.25	.25	.37	.36	*
13. De-wheeling (wheels removed from) locomotives, per locomotive	.70	1.99	1.75	3.00	5.60	*	...	...	*
14. Wheeling (wheels applied to) locomotives, per locomotive	.80	3.80	8.35	4.00	5.60	*	...	...	*
15. Bolting up front end of locomotive complete, per locomotive	.50	.70	...	...	...	*	4.815	3.18	*
16. Covering all work on flues, except installing (applying) them, per flue	....	.349	4.77	4.77	4.77	.215	3.4662	...	...
17. Covering all work on flues, plus installing (applying) them, per flue	.14	...	...	...	...	...	...	.1947	.155

* Done by day work.

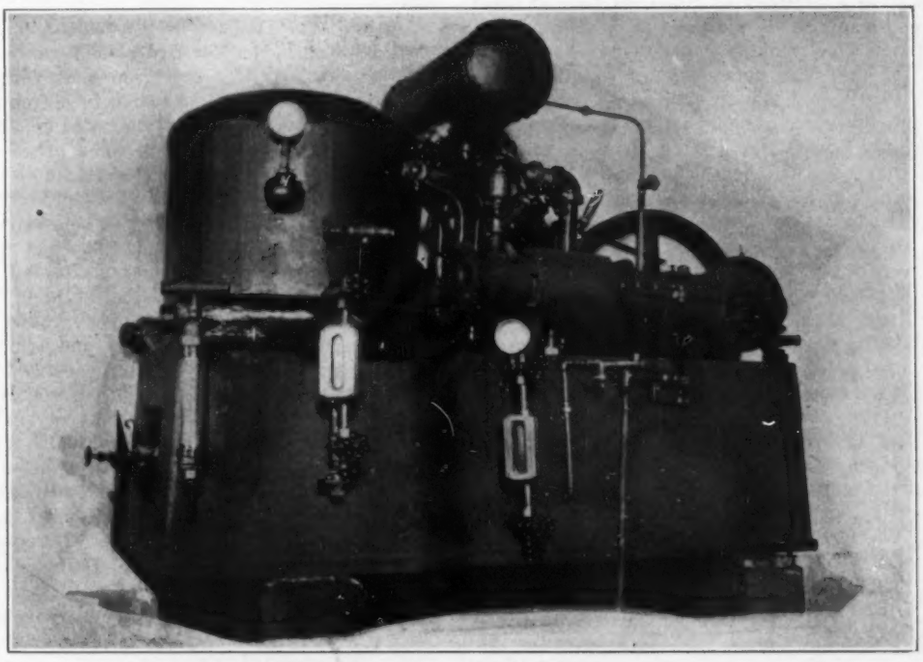
In conclusion the writer is not unaware of the fact that all these figures are not conclusive in respect of which shop is really most efficient as regards getting its repairs done at least cost, even that they are but indicative. He is aware that one road might be considerably higher than other roads in respect of an item or items, the aggregate of which in one year would be so small as to make the difference in costs really a negligible quantity; and that, on the other hand, a road which was low on some item of no importance might be very high on some item whose aggregate in a year might mean a large sum; hence in which a cost only 5 per cent. greater than that of competitors might be anything but a negligible quantity. To arrive at which road really operated its shops the most economically in comparison with other roads would therefore necessitate a knowledge of what the aggregate cost of repairs was for each road per annum, and per shop per annum and of how many cars and how many locomotives repaired this sum covered. For the purpose of ascertaining whether an increase in freight rates were advisable or just, the aggregate of all the roads' expenditures for repair shop would require to be ascertained. Having ascertained that one road gets its repairs done at an average saving of say 30 per cent. less, all things considered, than its competitors, it would be easy to figure what a saving of 30 per cent. on the total for all the roads amounted to and what proportion this 30 per cent. bore to the estimated aggregate resulting from the proposed increase of rates.

The Mechanical Handling of Freight.—A paper on this subject by Samuel B. Fowler of Boston will be presented at the New York meeting of the American Society of Mechanical Engineers, 29 West Thirty-ninth street, on Tuesday evening, January 10. The subject will be discussed by railroad officials and by officers of large industrial establishments, where the handling of great quantities of freight is a serious problem. Lack of adequate terminal facilities, increase of net income and higher or lower freight rates present problems, the solutions of which are vital to the transportation company, shipper and consignee alike. The capacity of present terminals can be increased by handling larger unit loads and moving them at greater speed, as well as by increasing the floor areas by the use of freight sheds of more than one story. This is made possible by the substitution of mechanical devices for manual labor and hand trucks.

Svea Caloric Engine Test

An illustrated description of the Svea caloric engine, invented by G. Emil Hesse, New York City, appeared in *The Iron Age*, March 16, 1905. The results of tests made on a 2-hp. engine, which show a remarkable economy in the amount of fuel consumed, have been recently made public. This engine differs from the ordinary types of hot air engines now on the market in the rate of heat transfer. In the existing models it is said that this rate is very slow, as the air is heated by the rising of warm layers into the stationary cooler layers above, while in the Svea engine the cool air is split up into thin sheets and passed over heated plates, from which it absorbs heat by radiation.

In the operation of the engine, cool air is drawn into the rear cylinder at each stroke, and on the return stroke is forced through the heater. Here it is broken up into thin layers absorbing heat from the hot plates and from there it passes to the power cylinder, from which it is exhausted into the atmosphere after expanding and doing its work.



The 2-Hp. Svea Caloric Engine Invented by G. Emil Hesse, New York City.

The following table gives the principal results of the test:

Diameter of cylinders, air and power, inches	4¼
Length of stroke, inches	4⅞
Air pressure, pounds	40
Temperature of air, degrees F	450
Speed, revolutions per minute	200
Indicated horsepower	2.4
Brake horsepower	1.7
Fuel per brake horsepower-hour, pounds	4.9

When it is taken into consideration that a steam engine of the same size would require from 10 to 15 lb. of fuel per horsepower-hour, the economy of this new engine is at once apparent. The engine tested uses air at a pressure of 40 lb. and at a temperature of 450 degrees F., but it planned to build a 100-hp. engine designed for a pressure of 250 lb. and a temperature of 700 degrees F. In this engine it is expected that 1 hp.-hour will be developed from 1 lb. of fuel, or possibly less.

The Iroquois Iron Company, Chicago, has increased its capital stock from $3,000,000 to $5,000,000. The additional $2,000,000 of stock has been taken by the old stockholders in proportion to their original holdings. The two new furnaces which this company has under construction were financed last summer by a bond issue of $2,300,000, the company having had no bonded debt until then.

NEW IRON AND STEEL WORKS CONSTRUCTION

A SUMMARY OF WORK COMPLETED IN 1910 OR THAT IS NOW UNDER WAY

Eighteen Blast Furnaces Building or Planned, with Annual Capacity of 2,220,000 Tons—No New Steel Capacity Projected Beyond That Announced One Year Ago

The statements below summing up new construction now under way in the iron and steel industries is noteworthy chiefly in that it contains comparatively little that was not announced in these columns one year ago. Our issue of January 6, 1910, gave an impressive recital of new capacity under construction or on which work would go forward in 1910. It showed that 19 coke blast furnaces, with an annual capacity of 2,650,000 tons, were then building, or were planned; also that open hearth steel plants were then projected or under construction which would have a capacity of 2,850,000 tons of steel a year. Beyond a few small additions to steel foundries, not a ton of new steel making capacity has been built or arranged for that was not scheduled in our article of January, 1910. Work has been done on all the projects then spoken of, however, except that of the Ohio Iron & Steel Company, Lowellville, Ohio. There is no present prospect that this will be carried out. Much less than one-third of the 2,850,000 tons of new open hearth capacity referred to a year ago was put in operation in 1910.

Below is given a statement of blast furnace and steel works construction on which work is now in progress or will soon be undertaken. One year ago we enumerated 19 coke blast furnaces which were building or planned, their rated annual capacity being 2,650,000 tons. Of these the following were completed and blown in in 1910: Indiana Steel Company, two (one blown in), 300,000 tons; Bethlehem Steel Company, one, 150,000 tons; Jones & Laughlin Steel Company, two, 350,000 tons; Youngstown Steel & Tube Company, one, 175,000 tons; Worth Brothers Company, one, 120,000 tons; Corrigan, McKinney & Co., one, 120,000 tons; Wickwire Steel Company, one, 120,000 tons; Detroit Iron & Steel Company, one, 95,000 tons. Total, 1,430,000 tons. To-day 18 coke furnaces are building or planned. They are as follows, with estimated annual capacity:

	No.	Capacity. Gross tons.
American Steel & Wire Company	1	160,000
Minnesota Steel Company	2	280,000
Inland Steel Company	1	125,000
Republic Iron & Steel Company	1	160,000
Bethlehem Steel Company	2	300,000
Worth Brothers Company	1	125,000
Corrigan, McKinney & Co.	2	240,000
Pittsburgh Steel Company	2	250,000
Rogers-Brown Iron Company	2	240,000
Iroquois Furnace Company	2	240,000
Duluth Furnace Company	1	100,000
Alan Wood Iron & Steel Company	1	(Alternate)
Totals	18	2,220,000

The state of the iron trade will determine in part how much of this capacity will become active in 1911; present indications are that much less than half of it will be blown in this year. Two years ago the United States Steel Corporation had 10 blast furnaces under construction, including six at Gary; last year it had three building, including two at Gary; to-day it has three—one at Cleveland and two at Duluth—with annual capacity of 440,000 tons. Two years ago the independent steel companies had practically no new blast furnace work on hand. One year ago they had 1,375,000 tons in annual capacity under construction and to-day 960,000 tons.

UNITED STATES STEEL CORPORATION

The year 1910 has seen the practical completion of some of the new construction which the United States Steel Corporation subsidiaries have had on hand for the past two years, while there has been progress in several new undertakings of importance, particularly those of the American Steel & Wire Company in the Birmingham district, the American Sheet & Tin Plate Company and the American Bridge Company at Gary and the Minnesota Steel Company at Duluth. In addition to what is referred to below of iron and steel works construction, work has been in progress on an extension to the cement plant at Buffington, Ind., which will increase the capacity by 4,000,000 barrels a year, bringing the annual capacity of the cement plants of the Universal Portland Cement Company in that district to 10,000,000 barrels.

Indiana Steel Company

Nos. 5 and 6, the last two blast furnaces of the eight belonging to the first two groups at Gary, were completed in 1910. No. 6 was blown in March 16, but No. 5 has not yet been operated. The third group of 14 60-ton open hearth furnaces was brought practically to completion and could soon have been made available if required. Of the four blocks of by-product coke ovens, 140 ovens each, probably half will be started in 1911 and more will be ready if needed. The gas from the coke ovens will be used for the soaking pits and the reheating furnaces at the steel mills. The building is under construction for a second power house, known on the company's plans as No. 1. Machinery and equipment are under contract for six power units, each of 3000 kw., consisting of electric generators and gas engines using blast furnace gas, similar in general construction to the engine and generator units in the plant which now furnishes all the power for the Gary mills. The building for the 60-in. universal plate mill is practically completed, and the mill, motor and equipment are being installed. The 18-in. merchant mill was started December 16, 1909. The 14-in. mill was completed and started April 1, 1910. Construction work is still under way on two 12-in. mills and one 10-in. bar mill. These will be ready for operation early in 1911. The axle mill was completed in July, 1910, and operated about a month, closing down in August for lack of orders for commercial operation. A description of this mill appeared in *The Iron Age* of August 18, 1910.

Illinois Steel Company

The new light structural mill of 24-in. and 18-in. stands, with capacity of 15,000 tons a month, announced one year ago, is not yet completed, but will be ready for operation in the early part of 1911. It will be electrically driven, power being supplied by two low pressure steam turbines, using exhaust steam from the present structural mill engines. The new mill will be next to the large structural mill at the north end of the plant. The company has let contracts for a new power plant at the Joliet mills and work on the foundation is under way. This plant will have three gas-electric units of 3000 kw. each, using blast furnace gas; they will be similar in general design to the generators and gas engine units at the Gary mills and the South Works.

Carnegie Steel Company

Only preliminary work, including the laying of two tracks, has been done on the site of the projected mills at Girard, Ohio, for rolling steel bars, hoops and small shapes. These mills will be electrically driven, power being supplied from blast furnace gas engines at the Ohio works.

National Tube Company

A continuous skelp mill at the Lorain, Ohio, works, and two butt weld mills for small pipe, have been practically completed and could soon be put in operation if required.

American Steel & Wire Company

Work has been actively prosecuted in the past year on the new wire plant in the Birmingham district, located about a mile southwest of the Ensley steel works. The entire wire plant will be electrically driven, but a departure is being made from the original plan for utilizing coke oven gas in gas engines. Low pressure turbines using steam for the reciprocating engines at the Ensley blooming and rail mills in one case and at the blast furnaces in another will make about 10,000 kw. available for transmission to the rod and wire mills and to the coke works. The new plant will have an output of about 400 tons of wire products a day. Gas from the coke ovens of the Tennessee company, now under construction at Wylam, will be used in the heating furnaces either at the wire plant or at Ensley.

The new 500-ton blast furnace, the fourth at the Central works at Cleveland, which was authorized a year ago, is well advanced toward completion.

Tennessee Coal, Iron & Railroad Company

The two 75-ton open hearth furnaces which were added to meet the steel requirements of the new American Steel & Wire Company plant have been finished, giving a total of eight large furnaces, four on each side of the converting plant. Work on the storage reservoir, which will contain 2,500,000,000 gal. of water, the supply being secured by damming Village Creek, will be completed in the coming year, together with the 25,000,000-gal. pumping station. The 280 by-product coke ovens at Wylam are expected to be in operation in 1911.

The American Sheet & Tin Plate Company

The steel buildings are up and the work of equipping the mills is well under way at the new plant at Gary. It consists of two 72-in. plate mills, 4 jobbing mills and 16 sheet mills, together with galvanizing department and auxiliary facilities. Electric power will be used exclusively, derived from the power stations at Gary and South Chicago.

American Bridge Company

The new plant at Gary, Ind., is nearing completion and is expected to be ready for operation in March, 1911. The capacity will be 10,000 tons per month of fabricated material. Additional units will be provided to meet future requirements. The full operation of the plant may be delayed somewhat, pending the erection of dwellings for workmen.

Minnesota Steel Company

A large amount of foundation and other work has been done at the site of the proposed steel plant at Duluth. The two blast furnaces will be 22 x 95 ft. The steel plant will have seven 75-ton basic open hearth furnaces, and there will be a 600-ton metal mixer. The rolling mills consist of a 40-in. blooming mill, 28-in. combined rail and structural mill, one combined merchant mill, with nine stands of roughing and seven stands of finishing rolls. The capacity will be 225,000 tons a year of rails, bars and structural shapes.

INDEPENDENT STEEL COMPANIES

Bethlehem Steel Company

Extensive improvements and additions have been made at the works of this company at South Bethlehem, Pa, the new construction completed, as well as that in course of erection representing an outlay of $7,500,000.

NEW WORK OF 1910 AT THE LEHIGH PLANT.

Blast furnace D, 22 x 90 ft., with five stoves of the McClure type, 22 x 100 ft. each, was completed and put in blast in April. Blast furnaces B and C were relined, thoroughly remodeled and put in blast. Five 75-ton broad gauge locomotives and two 40-ton 3-ft. gauge locomotives were added to the yard equipment.

In the iron foundry were installed and placed in service one 2000-ft. motor-driven air compressor, two motor-driven cupola blowers and two new cranes of 20 tons and 75 tons capacity respectively. A water cinder mill was also installed.

To the crucible department were added a cold drawing outfit and straighteners for cold drawing from ¼ in. to 3 in. The hammer shop and melting furnace buildings were rebuilt and enlarged, two 36-pot crucible melting furnaces and one annealing furnace being added. A new crucible steel warehouse has also been provided.

Considerable expenditures were made in the armor plate, forge and projectile departments. A 75-ton crane was added in the armor plate machine shop. In the treatment department the tempering plant was enlarged and there was also built a machine shop, 60 x 206 ft., for cutting out and machining test bars from forgings. Two 30-ton cranes were installed here. New facilities were also provided for straightening and finishing special alloy steel bars. Changes were made in the drop forge department which doubled the capacity of the hammer shop. Several new 3500-lb. steam drop hammers, trimming dresses and a new heading machine were added. In the die sinking end a number of tools were added. The machine shop facilities of the projectile department have been more than doubled. A wing 61 x 159 ft., and annex, 39 x 140 ft., containing $150,000 worth of machine tools, have been added to the original machine shop building, which was 42 x 180 ft. The facilities for treating projectiles were more than doubled, the treatment building being considerably enlarged. A new saw repair shop has been erected and provided with new equipment.

At No. 2 shop, which is the largest of the company's machine shops, an annex was built on the north side, 60 x 1225 ft., in which over $500,000 worth of machine tools was installed, giving large additional capacity for the machining of guns of all sizes. This shop before the addition was 117½ x 1522 ft. A new building, 390 x 75 ft., with 50 ft. clear hight, was completed, known as No. 6 machine shop, which is to be devoted entirely to the erection of gas engines. Over $500,000 worth of machine tools and two 75-ton cranes have been installed. New office buildings were built for the projectile department, steel casting department and yard department.

NEW WORK OF 1910 AT SAUCON PLANT.

There was finished and put in operation a well equipped repair machine shop 60 x 400 ft., to take care of both mechanical and electrical repairs, also the turning of rolls for the rail, structural and billet mills. To the equipment of open hearth plant No. 2 38 double truck mold cars were added. A rail loading crane, equipped with magnets, was added at the rail mill, and the rail finishing department was extended to permit of the manufacture of 60-ft. rails. The structural shop was materially enlarged by an annex on the north side. These extensions included a new template shop as well as a shop office. A new general office building for the Saucon plant was erected and occupied.

NEW WORK UNDER WAY AT THE LEHIGH PLANT.

Two blast furnaces, F and G, 22 x 90 ft. each, equipped with five stoves of the McClure type, 22 x 100 ft. each, also two large dry dust catchers and three Steinbart gas washing towers per furnace, are nearing completion and will be put in service early in 1911. A Heyl & Patterson casting machine is being installed. A 6000-hp. boiler plant will burn blast furnace gas. The company is building nine single gas driven blowing engines, to be placed in a new blowing engine house, 100 x 310 ft., equipped with a 40-ton crane. Added equipment for the existing electric power station will be three 1500-kw. gas driven power engines, also being built by the company. To wash the gas for this entire gas engine equipment, in addition to the gas washing apparatus which is part of each blast furnace installation, there will be a complete gas washing plant, consisting of five spraying towers and five Theisen rotary scrubbers, each of 7500-hp. capacity, with three pressure blowers.

In connection with the two large new blast furnaces there are also being built two new sets of Hoover & Mason coke and ore bins, with the automatic weighing scale cars. Old blast furnace A is being dismantled, with the idea of erecting on its site a new and complete modern blast furnace. When all of these improvements

are completed the company's blast furnace plant will consist of seven furnaces, with a monthly capacity of 75,000 tons of pig iron.

At the No. 1 rolling mill the small bar mills are to be completely remodeled and changed to electric drive. The improvements to be made will result in making this virtually a new department. In the press forge department a new heating furnace is being installed, together with a 60-ton crane to serve it. A new repair shop and engine house will also be provided for this department. In the No. 2 and No. 3 machine shops steam engines are to be taken out and electric drives substituted, which will result in all of the machine shops in the entire Lehigh plant being completely electrically driven. In fact, when these improvements are completed, the entire Lehigh plant will be electrically driven, with the single exception of the forging tools.

NEW WORK UNDER WAY AT THE SAUCON PLANT.

A complete Bessemer plant is being installed, including two 20-ton vessels, a 400-ton mixer, also a bottom and mixing house, &c., which will be used in connection with the No. 2 open hearth department for making steel by the duplex process. This Bessemer plant is rapidly nearing completion, and will be placed in service early in 1911. For blowing the converters there is being installed a 46 and 84 x 84 x 60-in. Southwark cross-compound blowing engine. The Bessemer plant will be equipped with a 60-ton ladle crane, and a new 125-ton ladle crane is to be installed in No. 2 open hearth department to take care of the increased output. A new mold yard and a new scrap reclaiming plant are being provided to take care of both the open hearth and Bessemer plants. In addition the stripper has been relocated, bringing it in direct proximity to the open hearth plant.

A new central pumping station to serve both Lehigh and Saucon plants, and a new electric power station have also been built. Moreover, the additional capacity has made necessary an extensive interchange railroad yard, which is rapidly nearing completion.

COKE PLANT.

The Didier-March Company, a German corporation, with American headquarters in the Hudson Terminal Building, 30 Church street, New York City, is now constructing, in immediate proximity to the Bethlehem Steel Company's property, a $5,000,000 coke plant, to have an ultimate capacity of 7500 net tons of coke a day, as well as a plant for reclaiming the resultant by-products. Practically the entire output of coke from this plant will be sold to the Bethlehem Steel Company for use in its operations. The coke plant, however, will be constructed and operated by the Didier-March Company, entirely independent of the Bethlehem Steel Company.

Crucible Steel Company of America

For its Atha Works, at Harrison, N. J., the Crucible Steel Company of America is now taking bids for a large steel structure to cover its new electric and open hearth furnaces, also for the enlargement of its gun and projectile buildings, together with the construction of a new office building upon the property recently acquired adjoining the present plant. In addition the company is installing a 1500-ton press in a large new building. It is the intention in the coming year also to install at this works a low pressure steam turbine system to convert a large amount of exhaust steam into electric power, securing in this way some 1500 kw.

At the Park mill, Pittsburgh, the company has recently installed a large crane runway capable of taking care of 20,000 tons of billets and scrap through the use of three traveling cranes with magnets attached. It is planned to erect at this plant in the coming year a new boiler plant of 5000 hp. capacity.

At the Norwalk, Ohio, plant it is planned to build a crane runway to handle the output of the mill through the use of magnets.

For more economically handling the billets coming into the Singer works at Pittsburgh the company is finishing the erection of a pneumatic lift, which is a new departure in connection with the handling of such raw material.

The third open hearth furnace has just been completed at the Crescent plant, Pittsburgh, and new electric charging machines and other necessary equipment have been provided to handle more economically the output of the three furnaces.

Republic Iron & Steel Company

Carrying out the programme announced in the latter part of 1909, the Republic Iron & Steel Company is now building at Youngstown, Ohio, a blast furnace to be known as Haselton No. 4, and on the opposite side of the Mahoning River an open hearth plant consisting of eight 60-ton furnaces, with blooming mill and billet and sheet bar mills. The new tube plant of the company at Youngstown, completed in 1910, is described and illustrated elsewhere in this issue.

Jones & Laughlin Steel Company

The three blast furnaces at the new Aliquippa plant which were referred to one year ago have all been in operation in 1910, though only one is now in blast. There has also been completed and put in operation at Aliquippa in the past year a tin plate plant with 12 hot mills, a rod mill and wire and nail works. New construction at Aliquippa yet to be completed includes four Talbot open hearth furnaces with a daily capacity of 250 tons each, a 38-in. blooming mill and a 20-in. billet mill. On the latter sheet bars and small billets will be rolled. At present the steel used at Aliquippa in the tin plate and wire plants is shipped from the South Side works in Pittsburgh.

Lackawanna Steel Company

At the plant of the Lackawanna Steel Company, South Buffalo, N. Y., work is now in progress on a continuous merchant mill containing one 6-stand 12-in. continuous roofing train and four 2-stand 10-in. finishing mills, having a total annual capacity of 100,000 tons of small squares, rounds, ovals and shapes. In the past year the company has made extensive improvements at rail mills No. 2 to enable it to roll tie plates, rounds, &c.

Cambria Steel Company

The rod mills and wire mills on which work has been in progress at the Cambria plant, Johnstown, Pa., in the past year will be ready for operation in the first half of 1911. The rod mill will probably be operated in March and the wire mills by May. In the past year the new 18-in. continuous billet mill has been put in operation. It was described in *The Iron Age* of May 5, 1910, page 1072. Four 50-ton open hearth furnaces have also been added at the Cambria plant. At the Gautier Works semi-continuous 8 and 12-in. mills were added in 1910. An important piece of construction now under way is the Quemahoning dam and pipe line, which will greatly increase the company's water supply.

Pennsylvania Steel Company

The following improvements and additions to the plant of the Pennsylvania Steel Company at Steelton, Pa., are now under construction, and will be completed in the coming year: 3000 hp. of boilers; additional stove equipment and new pumps for blast furnaces; a new car repair shop; a gantry storage crane; additional pit heating furnaces for the slabbing mill, which now has six pit furnaces; also a new building, with crane and other equipment for breaking up scrap.

Inland Steel Company

The principal new construction planned for 1911 by the Inland Steel Company, Chicago, is the building of a second blast furnace, 19½ x 85 ft., at Indiana Harbor, Ind.

The company completed important additions to its mills at Indiana Harbor, which were reviewed at length in *The Iron Age* of October 20, 1910. Eight new hot sheet mills were added to the 10 already in operation in the sheet department, three new mills being started in July. Two new open hearth furnaces of 60 tons capacity were completed and were started in August, making eight

open hearth furnaces at this plant. A new billet mill was also completed last year in connection with a sheet bar mill which is operated in the same train, the billet and sheet bar mills being operated alternately and receiving blooms from the blooming mill. The company has also added an extensive equipment of special machinery for making roofing, siding and other commercial forms of sheets.

Worth Brothers' Company

Worth Brothers Company, Coatesville, Pa., blew in in the past year its No. 1 blast furnace. At its plate plant two heating furnaces were built and additional heating capacity was provided at the Valley mills. The No. 2 blast furnace, 18½ x 85 ft., a duplicate of No. 1, is still under construction. Additional heating capacity is to be provided for the No. 3 mill and Valley mills and a new stockhouse will be built at the Viaduct works. All of this new construction will probably be finished by the early summer of 1911. Repairs are being made preliminary to the operation of two additional small trains of rolls at the Valley works, which have not been in use for several years.

Eastern Steel Company

The two open hearth furnaces of 80 tons capacity each which were under construction at the Pottsville, Pa., plant of the Eastern Steel Company one year ago, were completed in 1910, but owing to trade conditions only one has been in operation so far. The capacity of the plant is now 22,000 to 25,000 tons of steel a month.

Maryland Steel Company

At Sparrows Point, Md., the Maryland Steel Company completed in 1910 five 50-ton tilting open hearth furnaces, referred to in this review one year ago. The plant is equipped so that steel can be manufactured either by the straight open hearth or the duplex process. Plans are under way to replace blast furnace A with a new stack, with skip hoist, and to build the necessary stock bins.

Pittsburgh Steel Company

Announcement was made in December that the Pittsburgh Steel Company had decided to build two blast furnaces at Monessen, Pa., to supply basic pig iron for its 12 60-ton open hearth furnaces. The rod mill at Monessen has a capacity of 150,000 tons a year.

Sharon Steel Hoop Company

A new wide band mill is now under construction at the works of the Sharon Steel Hoop Company, Sharon, Pa., and will be ready for operation in the late spring of 1911. The additions made in the past year include a 35-ton basic open hearth furnace and the reconstruction of a small acid furnace into a 35-ton basic furnace, giving the plant three acid and three basic furnaces. A 350-hp. Stirling boiler was also added.

Upson Nut Company

The new steel plant of the Upson Nut Company, Cleveland, Ohio, is nearing completion. The plant will consist of four open hearth furnaces and a 34-in. blooming mill, which will be ready for operation about March 1, and a bar mill, which will be finished about May 1. The blooming mill will be driven by a 46 x 60 in. reversing engine.

Wisconsin Steel Company

The International Harvester Company's steel making subsidiary, the Wisconsin Steel Company, has no plans for additions in 1911 other than to continue the construction of coke ovens in connection with its coal mining developments in Harlan County, Ky. The plant will consist of 300 beehive ovens, with the necessary shops and equipment and dwellings for the employees.

Lukens Iron & Steel Company

At the Coatesville, Pa., plant of the Lukens Iron & Steel Company a 750-kw. turbine generator of the Rateau-Smoot type was installed in the past year. The company added also a number of electric traveling cranes and special machines. A new departure is that for the manufacture of trolley poles from steel plates, which are pressed into rectangular form with a view to greater strength and resistance than is given by the tubular form. The company has been manufacturing the Jacobs-Shupert patent locomotive firebox, but this will be taken over shortly by a separate company in which it has a large interest.

Inter-Ocean Steel Company

Organized in 1908 with $3,000,000 capital, the Inter-Ocean Steel Company, Chicago, began operations in 1910 at its new plant at Chicago Heights, Ill. Construction work was begun in April, 1909. A 40-ton acid open hearth furnace was completed in April, 1910. A second furnace of the same size was completed about November 1, 1910. This plant has special rolling equipment for making circular or ring forms of steel, including locomotive tires, shells and rings for mining machinery, flanges for hydraulic pipe and other products of this character, which require a special quality of low phosphorus steel. The metal from the open hearth furnaces is poured in cylindrical ingots. After the ingots have cooled they go to slicing lathes which cut them into drum shaped sections or "cheeses." The "cheese" is heated in a continuous furnace and is put under a 5000-ton hydraulic press which serves the purpose of a blooming mill, producing an annular bloom. Three trains of special rolls convert the bloom into finished product. The first train enlarges the hole and breaks down the bloom. The bloom then passes to the tire rolling mill, which rolls it down and forms the flanges of locomotive tires. The third stand of rolls is the finishing mill, which completes the rolling operation. The tires or rings then go to the machine shop, where they are turned on boring mills to give the necessary machine finish.

Youngstown Sheet & Tube Company

The third blast furnace of this company was finished and blown in at Youngstown last year, and another bridge was provided for the handling of ore. Light sheet mills were completed and put in operation in 1910.

Southern Iron & Steel Company

Some future construction work is in view for the plants of the Southern Iron & Steel Company, but definite details cannot be announced as yet. The new rod and wire mills at Alabama City were completed and put in operation last year, the capacity being about 400 tons of rods a day. There are three billet heating furnaces. Additional washer capacity was installed at the company's brown ore mines at Bartow, Ga.

Halcomb Steel Company

In the past year the Halcomb Steel Company, Syracuse, N. Y., has made a 60 x 80 ft. extension to its wire mill for a pickling room, also an addition, 44 x 141 ft., to the melting building, giving room for two more 24-pot crucible furnaces, one of which is now building. An extension, 100 x 105 ft., to the rolling mill was necessary to provide for a new eight-stand 12-in. mill for rolling hand rounds. This mill is driven by a motor and rope drive and is one of the most complete hand round mills extant. The capacity of several departments of the plant has been overtaxed in the past year.

John A. Roebling's Sons Company

At its Roebling, N. J., works, the John A. Roebling's Sons Company now has under construction an additional wire mill and new buildings for wire cloth manufacture. In the town of Roebling about 100 additional dwellings are in course of erection. Illustrations of the work the company has done in this direction have already appeared in these columns. At the Trenton works of the company the changes in the past year have been in the provision of additional and improved equipment.

West Penn Steel Company

At its plant at Brackenridge, Pa., this company built in 1910 a second 80-ton open hearth furnace. It also added three sheet mills.

Forged Steel Wheel Company

This subsidiary of the Standard Steel Car Company, Butler, Pa., completed last year an open hearth plant containing six 50-ton furnaces. It was started up in September.

American Rolling Mill Company

The American Rolling Mill Company, Middletown, Ohio, reported one year ago as having under construction four 65-ton open hearth furnaces, with blooming and other rolling mills, will have the new furnaces completed in the next three months. The new annealing furnaces are well along and a conveyor system has been practically completed. A large new warehouse is under roof and will be ready for occupancy shortly.

MERCHANT BLAST FURNACES

Contracts will be let shortly for a new blast furnace to be built by the Zenith Furnace Company, Duluth, Minn., and the work of erection will start in the spring. This stack will be 18-ft. 6 in. x 75 ft., and will have a daily capacity 300 tons. Arthur G. McKee, Rockefeller Building, Cleveland, Ohio, is the engineer in charge.

The Iroquois Iron Company, Chicago, broke ground in August, 1910, for two new blast furnaces, which when completed will give the company four furnaces, with a total daily output of 1200 tons. The iron work is now nearly finished on the two new stacks and is in progress on the eight stoves. The new furnaces will be ready for operation in the summer of 1911. A new feature is the use of steam turbine blowing engines, three of which will be installed, two for regular operations and one in reserve.

The Rogers-Brown Iron Company will complete in 1911 the two furnaces it has had under construction at South Buffalo at its Susquehanna plant. They will have a capacity of 350 tons a day each.

Work is well advanced on two new blast furnaces that are being built by Corrigan, McKinney & Co., one at Cleveland, Ohio, alongside the River furnace completed in the past year, and the other at Josephine, Pa. Each of these furnaces will be 20 x 85 ft., and will have a daily capacity of 350 tons. It is expected that the Cleveland stack will be ready to blow in in February and the Josephine stack about May 1.

The Alan Wood Iron & Steel Company, Philadelphia, will build an alternate blast furnace stack at its Heckscher furnaces Swedeland, Pa. The new furnace will have a capacity of 350 to 400 tons a day and will only be in operation when one of the two existing furnaces is out, as no new blowing capacity is being provided.

Federal Furnace Company, Chicago, completed and put in operation in August, 1910, a pig casting machine.

The Andrews & Hitchcock Iron Company, Youngstown, Ohio, put in blast last year its rebuilt No. 1 Hubbard furnace, on which work was in progress in 1909. The company is now installing a new William Tod Company vertical, long cross head, high pressure blowing engine, with 49-in. cylinder, 60-in. stroke and 96-in. blowing tube, and will have it in operation soon.

The Hudson Iron Company expects to complete its improvements at its Secaucus, N. J., furnace in the first half of 1911. These include the building of four stoves, the installation of two 400-hp. boilers and a new boiler furnace stack.

Among the improvements made at the furnace of the Girard Iron Company, Girard, Ohio, last year was the installation of a steam pipe breaker designed by Ladd & Baker, Inc., Philadelphia. The machine is supplied with pigs in frames by an overhead crane, but an innovation is that the breaking is done when the pigs are in a horizontal position. The machine is very heavy and in design and construction is simple, all motions being produced directly by steam cylinders. Four pigs and the attached sow are broken at each stroke, the broken iron passing by gravity through a chute into railroad cars.

The Wellston Steel & Iron Company, Wellston, Ohio, completed a new blast furnace last year to replace one of its three stacks. Two new blowing engines and four Rust boilers were installed.

The new furnace of the Dayton Coal & Iron Company, Ltd., Dayton, Tenn., which has been under construction in the past year, is now completed and is expected to blow in this week. It replaces the old No. 1 furnace.

The Lake Superior Iron & Chemical Company, Detroit, Mich., has made plans for replacing the kiln process of charcoal production at all its furnaces by modern retort construction. This will make it possible to recover all the by-products and will afford the maximum of economy. The company has six furnaces, which are located at Ashland, Wis., and at Manistique, Newberry, Chocolay, Boyne City and Elk Rapids, Mich. Four of these furnaces are in operation at present. It is the expectation to reconstruct the Newberry plant first, and this work will be completed by July 1, 1911. The reconstruction of the other plants will require five years' time, and the expense of the work will be about $1,500,000. The company is also building a modern saw mill at its Newberry plant to convert the best part of its forest products into lumber and the inferior into wood, thus eliminating a very expensive operation, that of cutting raw material in the woods.

The new charcoal furnace of the East Jordan Furnace Company, East Jordan, Mich., was completed early in 1910, and was blown in January 17. It is 10 x 60 ft. and has a capacity of 24,000 tons a year.

ROLLING MILLS AND STEEL FOUNDRIES

The De Forest Sheet & Tin Plate Company, Niles, Ohio, added last year to its pickling and cold rolled department facilities for the manufacture of full pickled and cold rolled and full finish sheets and automobile body and furniture steel. The outlay was about $50,000.

The Highland Iron & Steel Company, Terre Haute, Ind., purchased in August the mill at Blue Island, Ill., of the Blue Island Rolling Mill & Car Company. After general repairs and the completion of a puddling and busheling furnace the mill was started up by the new owners October 31.

The Stoughton Engineering Company, 165 Broadway, New York, is designing a crucible steel melting furnace for the manufacture of steel castings for the Calumet & Hecla Mining Company at Calumet, Mich.

The Interstate Iron & Steel Company, Chicago, added a 22-in. bar mill to its plant at East Chicago. This is a mill with two stands of rolls adapted for rolling large sizes of bar iron. It began operation in April. This company now has 22-in., 16-in., 12-in., 9-in. and 8-in. mills for rolling bar iron.

New sheet mill construction apart from that spoken of above in connection with the new work of steel companies, included the completion of eight mills by the Canton Sheet Steel Company, Canton, Ohio; four by the Massillon Rolling Mill Company, Massillon, Ohio; one by the National Rolling Mill Company, Mansfield, Ohio; eight by the Phillips Sheet & Tin Plate Company, Weirton, W. Va.; one by the Stark Rolling Mill Company, Canton, Ohio; five by the Thomas Steel Company, Niles, Ohio. Follansbee Brothers now have two sheet mills under construction.

The McKeesport Tin Plate Company, McKeesport, Pa., is adding two tin plate mills, which are nearly completed. It built 10 new mills in 1910. The Phillips Sheet & Tin Plate Company completed 12 tin plate mills at Weirton, W. Va., last year; the Carnahan Tin Plate & Sheet Company, one at Canton, Ohio, and the Wilkes Rolling Mill Company, one at Sharon, Pa.

The Crucible Steel Casting Company, Lansdowne, Pa., has contracted for the installation of a 2-ton electric furnace of the Roechling-Rodenhauser induction type.

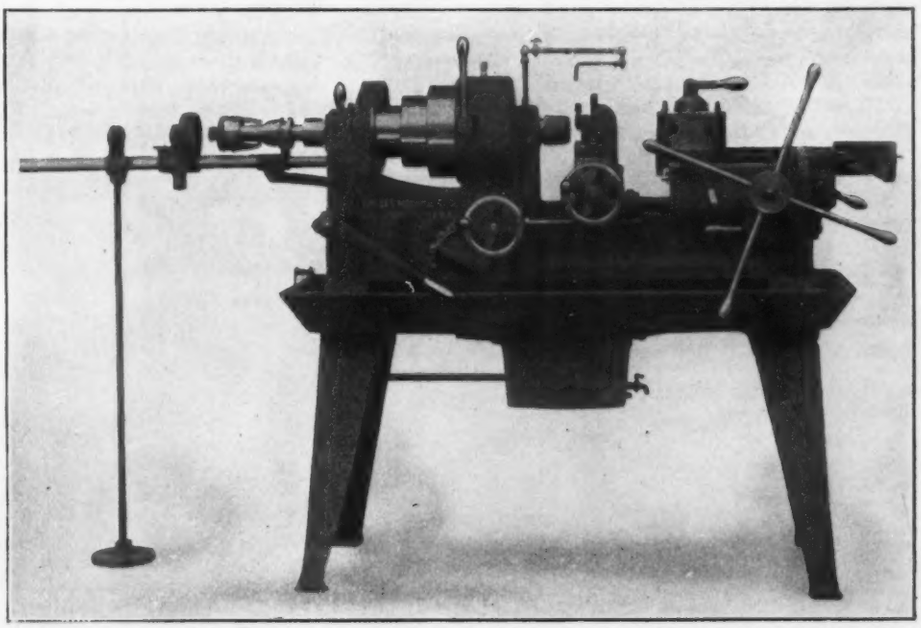
In the crucible steel department of its Chicago plant the Simonds Mfg. Company, Fitchburg, Mass., installed last year a Girod electric furnace, the first of this type to be built in the United States. In the transfer of the company's Chicago plant to Lockport, N. Y., where new construction is now under way, the Girod furnace was removed to be re-erected at Lockport, and ultimately it is expected further electric furnace capacity will be provided there.

The Dreses 1-in. Screw Machine

One of a New Line Having Friction Back Gears

A line of friction back geared screw machines has been developed by the Dreses Machine Tool Company, 227 West McMicken avenue, Cincinnati, Ohio. Four sizes in all of tool are built, to take ¾, 1, 1¼ and 1½ in. stock through the wire feed, the 1-in. machine being the size illustrated. It has an automatic chuck and wire feed, friction back gears, positive acting quick change feed gears, power feed for the turret slide, separately adjusted automatic stops for each hole in the turret and a fine longitudinal adjustment for the cross slide.

The headstock is cast in one piece with the bed and its design makes provision for adequate protection of the feed and back gearing. The spindle is driven by a three-step cone pulley. The back gear frictions are of the toggle joint type and their design is such that the entire operating mechanism can be removed and put back without taking out the spindle. The spindle bearings are lined with high grade babbitt metal, which is upset in their seats. The spindle nose construction is of an improved type, providing two blank cylindrical portions on each side of thread fitting the thimble or face plate. There is no bearing on the thread itself and it serves merely to hold the chuck on and has no effect upon the alignment. A very short nose brings the work close to the spindle bearing. The inner rear housing of the head takes up the thrust, thus allowing play in the front bearing for elongation, due to temperature changes, while at the same time the overhang and length of the front bearing are materially reduced from that which would be necessary if the thrust were taken up there.



A New Screw Machine with Friction Back Gears Built by the Dreses Machine Tool Company, Cincinnati, Ohio.

Like the 1½-in. screw machine illustrated in *The Iron Age* February 10, 1910, the chuck and stock feeding device is of the maker's standard type, but the operating mechanism has been simplified. The operating lever has been placed in a position where the operator can exert the greatest force with his left hand with the least exertion, and the split hub and clamp nut enable the position of this lever to be changed to correspond with the build and strength of the operator. The thimble spreading the chuck fingers at the rear end of the spindle has steps which enable stock, the diameter of which varies considerably, to be used without stopping the machine for readjustments.

The turret index ring is as nearly the full diameter as is practicable and is held in place by a long, square gibbed locking bolt. In this way the surface of the turret and the slide is not interrupted by the locking bolt and no particles of metal, caused by the wear of this member in its seat, can abrade the surface. The wear of the turret on its stem is also taken care of. Six stops, one for each of the holes in the turret, are located on a bracket in the turret slide base. This stop mechanism is placed in front of and on the outside of the top slide and is operated by a cam placed at the bottom of the turret. The abutment or stop dog makes about one-quarter of a revolution and can be easily put out of action so as to clear all six stops by an automatic locking plug. The bracket in which the stop screws are placed slides in a dovetail on the turret slide bed and when the stop dog strikes one of these screws it moves the bracket forward, thus knocking off the power feed. A slight additional movement can be given when desired for taking a finishing cut on a shoulder and for cleaning out the chips left by the tools by operating the turret by the pilot wheel. Four changes of geared power feed are rendered available by the small crank handle shown beneath the headstock, the mechanism being placed on the rear of the bed.

The hand wheel, bevel gears and adjusting screw give the cutting-off rest a longitudinal movement on the bed. The cross feed screw has a graduated dial on the hand wheel. An improved design of tool post is used, which opens at the left side, thus permitting them to be adjusted close to the face of the chuck. The wedges under the tools have a single dovetail to keep them back in position and they are shifted to adjust the tools to the proper hight by knurled thumb screws.

A very deep pan mounted under the bed of the machine provides for a large supply of cutting oil or compound and the reservoir is hinged to the pan, so that it can be readily cleaned. The interior of the reservoir is divided into two chambers, in the first of which the grit and dirt are separated and deposited before passing into the second chamber, from whence the pump draws clean oil and delivers it to the tools and the work. The leg at the tail end of the tool has a hinged joint, so that a three-point bearing support is secured, and the alignment is not disturbed by irregularities in the pull. The weight of the tool is about 1300 lb.

Germany Making Electric Steel from Basic Pig Iron.—Our German correspondent gives the following interesting information: From Luxemburg comes news of an important transaction in the steel trade. The Eicher Hüttenverein Le Gallais-Metz & Co. of Dommeldingen, which has recently begun to make steel directly from basic pig iron by means of the electric furnace, has entered into a community-of-interest arrangement with the Becker Steel Works, a concern that has just closed its first business year. The purpose of the arrangement is to turn over the electric steel of the Eicher Company to the Becker mills for rolling into commercial forms and marketing it. It is said that the Eicher establishment is the first in the world that has applied the electric furnace for the immediate conversion of the blast furnace product into steel. It obtains its current at low cost from gas engines driven by the furnace gases.

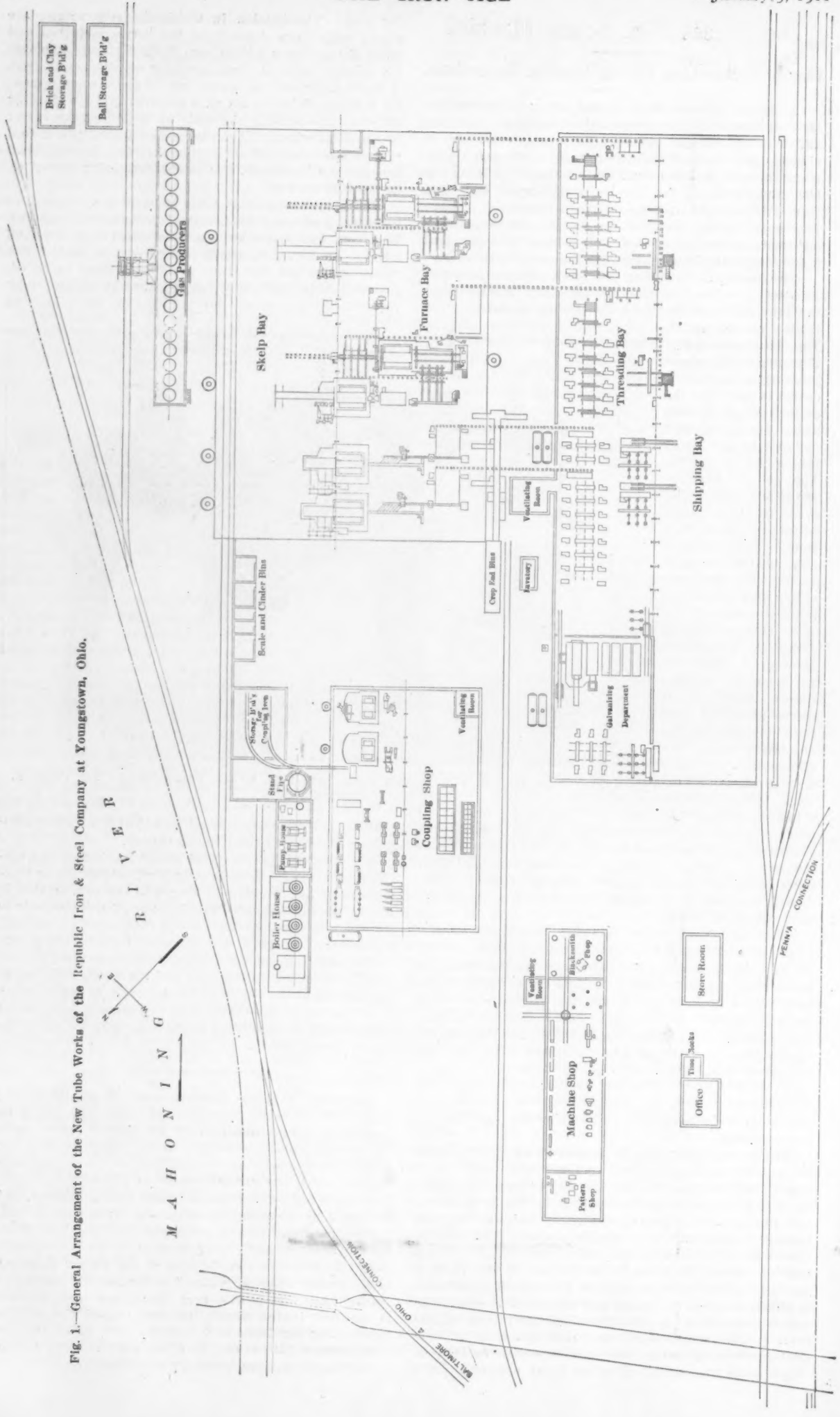


Fig. 1.—General Arrangement of the New Tube Works of the Republic Iron & Steel Company at Youngstown, Ohio.

The Republic Iron & Steel Company's New Tube Works

An Important Addition to Its Finishing Mills in the Youngstown, Ohio, District

The completion last year of the new tube works of the Republic Iron & Steel Company marked a further diversification of the finished product of this company and the entrance into the wrought pipe trade of another producer having raw materials and plant to control all the processes from the ore to the finished product in both Bessemer and open hearth steels. In 1908 and 1909 the company had increased its skelp production by building and putting in operation a 10-in. continuous and a 20-in. semicontinuous skelp mill at its Brown-Bonnell works at Youngstown, and reconstructing its 60-in. sheared plate mill. In May, 1909, its Executive Committee authorized the construction at Youngstown of a tube works consisting of two butt weld and two lap weld mills to make merchant and line pipe, casing and other welded tubular goods from ¼ in. in diameter up to 12 in. in diameter, the two butt weld mills to be designed to cover between them the range of sizes from ¼ to 3 in., inclusive, and the two lap weld mills to cover between them the range of sizes from 2 to 12 in., inclusive.

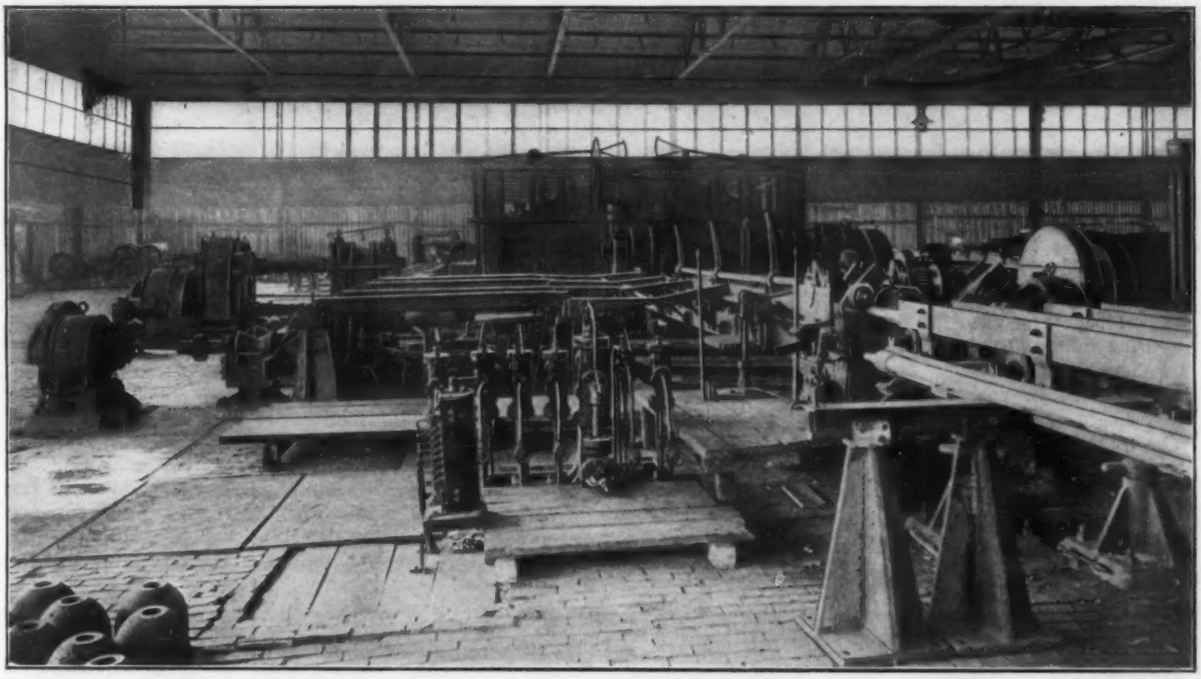


Fig. 2.—Lap Weld Furnace.

Important New Construction

While providing in this way an outlet for much of its Bessemer steel, the company started to put itself in position to furnish open hearth steel bars, for which the demand had been growing, and in October, 1909, announced a large programme of new construction at its properties on both sides of the Mahoning River, between Haselton and the downtown section of Youngstown, where the Brown-Bonnell plant is located. This included a new 450-ton blast furnace alongside the three of the Haselton group. On the opposite side of the river from the blast furnaces, and on the same side as the tube works—the company's river frontage being about 1¼ miles—a site was selected for a new steel plant, blooming mill and continuous mill. Plans were made also for a bridge over the river for taking hot metal from the blast furnaces to the open hearth plant. From the city of Youngstown the company secured the vacation of certain portions of streets, in low lying territory along the river, and agreed in return to build a viaduct across the low land. The tube works site is about a mile down the river from the Brown-Bonnell and Bessemer plants. The open hearth plant is still farther down. The Haselton furnaces, the Bessemer and Brown-Bonnell works, the open hearth works and the tube works are connected together by the company's own railroads and bridge, permitting cheap inter-departmental movement of hot metal, billets, skelp, &c. The site also has connections, either direct or through one of the other plants of the company, with all railroads in the Youngstown district, which include the Pennsylvania Lines, Lake Shore, Baltimore & Ohio and Erie railroads. The proximity of the site chosen to the Republic Iron & Steel Company's other operations made unnecessary the construction of any large power plant at the tube works. All power for the plant is electric current generated from blast furnace gas at the Haselton blast furnaces by an extension of the existing steam power plant there, the employment of steam in the tube works being confined to blowing the producers, heating the finishing departments and a few minor uses.

An Unusual Record for a New Plant

Immediately upon the authorization of construction the work of designing, building and organizing the tube plant was prosecuted vigorously, and in April, 1910, the first butt weld mill was put in operation. The other mills followed and by July, 1910, all departments had been operated and all sizes of merchant pipe within the above limits had been made. The plant has now been producing all sizes of pipe for about six months, shipping its product regularly to the trade. There have been no breakdowns and practically no starting up troubles, while the product has been very satisfactory and the scrap loss

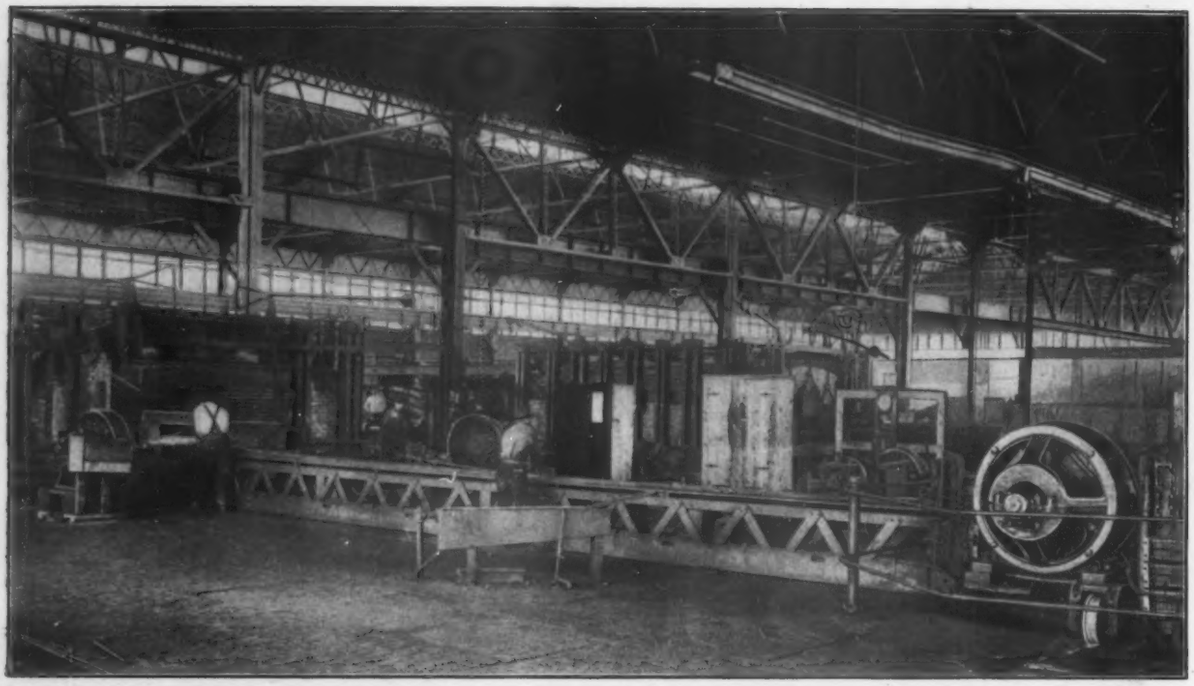


Fig. 3.—Butt Weld Furnace.

low. The results thus far attained indicate a probable production of 10,000 to 12,000 tons a month under good demand and full operation.

All machinery in the tube works is driven by individual direct connected direct current electric motors, and particular care was taken to install motors amply large for the service and to use as many duplicate motors as possible. Flywheels are provided on the motors at the welding rolls and on other machines where heavy loads of short duration occur. So far as possible the motors were placed in positions where they could be easily taken care of and away from the heat of the furnaces. The total number of motors used in the plant was 129, totaling 2450 hp.

In the design and construction of the plant every effort was made to properly protect the machinery to avoid accidents or personal injuries. Gear covers and geared railings were provided at all exposed points and the plant was inspected by the company's corps of accident inspectors for risks before starting up.

Arrangement of the Plant

Fig. 1 shows the general layout of the plant, which was designed with a view to the best use of the property available and to permit of indefinite extension. Figs. 2 to 7 are various interior views. The main buildings consist of four parallel bays, a skelp bay, a furnace bay, a threading bay, containing at one end the galvanizing department, and a shipping bay or warehouse. This plan permits of the addition of units without interference to operation. The skelp and furnace bays are high, roomy buildings of the ordinary rolling mill type, of steel construction, with ample air space to insure as far as possible comfortable working conditions in summer at the furnaces. The threading bay and shipping bay are lower steel frame buildings of the factory type, with

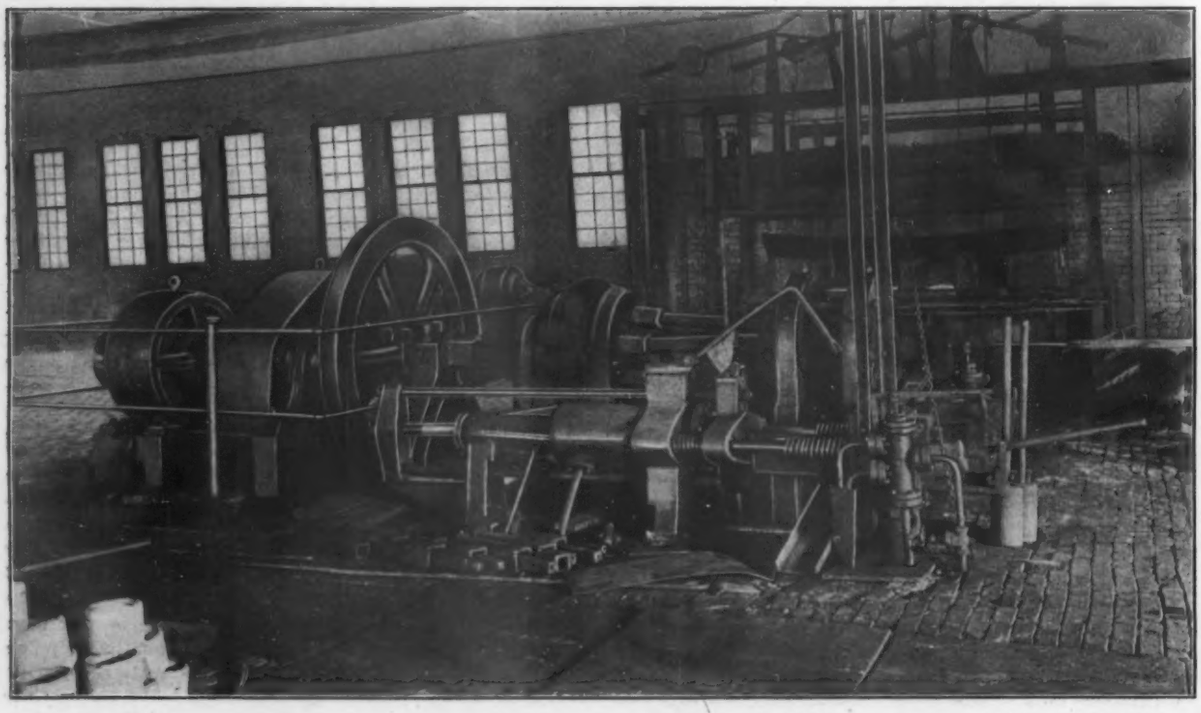


Fig. 4.—Coupling Rolling Machine.

Fig. 5.—Socket Shop.

brick sides, so as to be more easily heated in winter. The skelp bay, threading bay and shipping bay are well provided with electric cranes and the furnace bay with separate electrical trolleys at all points where necessary. Space was left between the furnace bay and the threading bay to permit good ventilation of the former during hot weather.

The subsidiary buildings, consisting of the machine shop, socket shop, producer building, office, &c., are placed, as shown on the plant, either out of the line of extension of the main buildings or at a reasonable distance from them. The total area of buildings under roof is about 5 acres; of the warehouse alone about 54,000 sq. ft.

The furnace equipment consists of two butt welding furnaces for the two butt weld mills and two bending and two lap welding furnaces for the two lap weld mills, together with two socket furnaces. All of these are of the ordinary Siemens regenerative type, strongly built, with large regenerator areas. Gas is furnished by 18 water seal gas producers housed in a steel building equipped with complete crushing, elevating and distributing machinery, providing for the economical handling of fuel.

Movement of Material

Taking up the general plan of the works, it will be noted that the general movement of the lap weld material is as follows: It is delivered from the rolling mill on the track shown under the crane in the skelp bay. It is handled by this crane and placed at the skelp charging machines; is charged, heated, scarfed and bent. It rolls down into the pit of the welding furnace, is charged by machine, is welded in the welding rolls and transferred to the sizing rolls; it is sized and then straightened in the cross rolls, cools, and is delivered from the

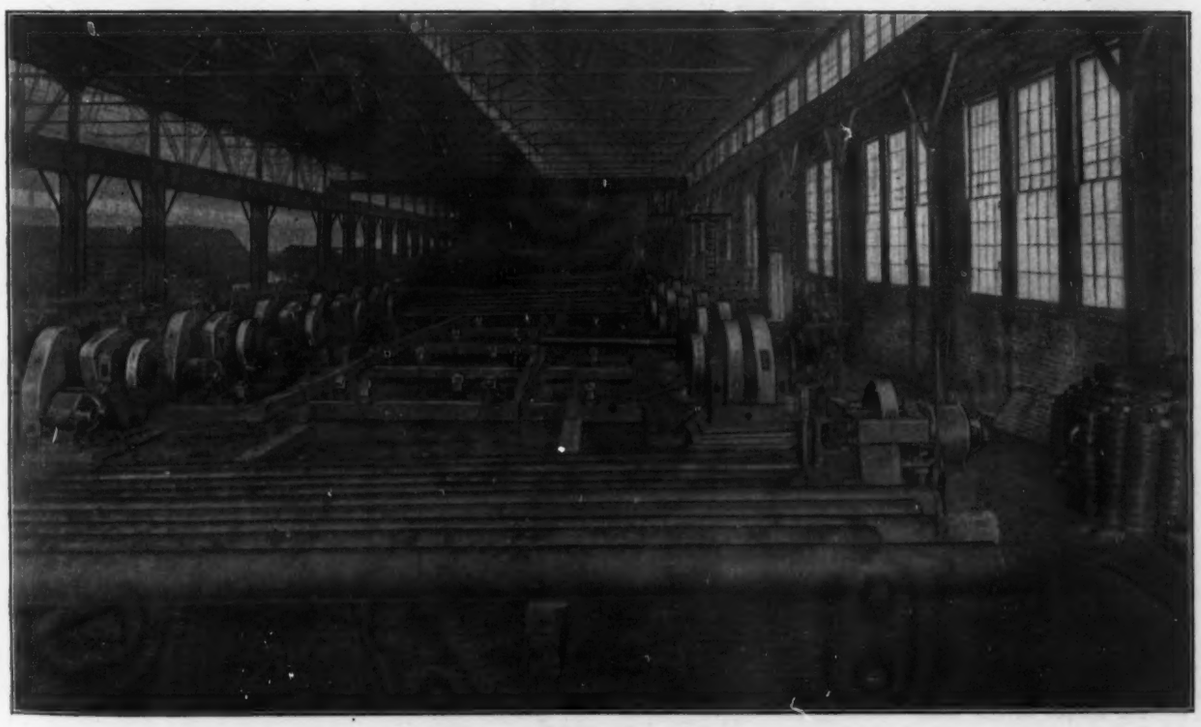


Fig. 6.—Threading Floor.

cooling rack into the threading bay by conveyor, where it is handled by cranes during the various finishing operations of cutting off, threading, testing, &c. At all times the material is either under traveling cranes, where it can be handled in bulk, or on an electric charging machine, transfer or conveyor, where it can be handled economically by the piece. The general movement of butt weld pipe is similar in principle, but with changes due to the difference in the processes.

Finishing and Auxiliary Departments

Each mill is fully equipped with motor driven cutting-off, threading, coupling screwing on machinery and hydraulic testing benches, so that each can be run as a separate unit if necessary; the arrangement is such that the material can move promptly through the various operations from the skelp bay to the warehouse or shipping bay as promptly as possible and without the accumulation of unfinished pipe. Hydraulic testing is done by water pressure furnished by motor driven pumps working against a hydraulic accumulator. The various pressures necessary are secured from the pressure water by individual intensifiers at the testing benches. By this system all pipe tested receives a definite test pressure, irrespective of anything which the operator at the testing bench can do, and there are thus certain advantages in definiteness over the ordinary individual steam pumps. All service water for the plant is taken by means of motor driven pumps from the river, pumped over a stand pipe and distributed where needed.

The galvanizing department of the plant is situated at one end of the threading bay and consists of one galvanizing pot, with its complement of acid and water tanks, threading machinery, testing machines, &c., and is covered by an electric traveling crane.

At all points in the plant, where necessary, scales are placed so that the amount of material charged and finished may be accurately determined and that the furnace scrap and other losses may be kept for accounting purposes.

In the coupling shop small sockets up to ¾-in. are made and finished from solid bars on automatic screw machines. The larger couplings are made from socket iron on roller welding machines and tapped on vertical multiple spindle machines. A complete oil distributing and recovery system is installed in the coupling shop.

There is a well equipped machine shop in which the tools are motor driven. This and the blacksmith and pattern shops, in the same building, are kept employed in the upkeep of the plant and in making the necessary taps, dies, &c.

The plant was designed, built and organized by the operating and engineering department of the Republic Iron and Steel Company, no outside engineer being employed.

Fig. 7.—View in Warehouse.

The Outerbridge Silicon Alloy.—A. E. Outerbridge, Jr., foundry chemist and metallurgist of Wm. Sellers & Co., Inc., Philadelphia, Pa., has completed arrangements with the J. W. Paxson Company of the same city, for the sale of Outerbridge silicon alloy, as covered by patents owned by him. This alloy makes gray iron castings softer, stronger, cleaner and more homogeneous; it also reduces shrinkage, cracking and blowholes and increases ductility. The iron can be poured at a greater distance from the cupola. It controls the character of the iron drawn from the cupola as perfectly as a governor controls the revolution of an engine, and, moreover, enables one to vary the grade of iron in individual ladles to suit special castings. It drives the dirt and slag to the top, when it can be skimmed off. Castings can be machined much faster, as they are softer. No expert or chemist is required to direct its use, as it is only necessary to drop a small quantity of the finely ground alloy on the bottom of the ladle before tapping. Mr. Outerbridge has had a long and varied experience in the treating and testing of metals. He was the first to introduce ferromanganese in the treatment of car wheel metal to regulate the chill and to increase the strength and ductility of the gray iron forming the plate or body of the wheel.

The Marion Steam Shovel Company, Marion, Ohio, which has been in business for 26 years, brought suit against the Marion Shovel & Dredge Company, recently incorporated, seeking to restrain the latter from the use of its name on the ground of the similarity being likely to lead to the diversion of trade. The court decided adversely to the suit, holding that the name of the new company is a sufficiently distinct designation.

The Seamless Pressed Steel & Mfg. Company, Redkey, Ind., is installing a plant and will in the near future be in position to turn out welded steel product by the oxy-acetlyene process, including boilers, vats, tanks and irregular shapes. The company will also manufacture automobile and truck frames by assembly welding.

A Bliss Straight Sided Press of Unusual Proportions

The E. W. Bliss Company, 11 Adams street, Brooklyn, N. Y., has recently built a straight sided single crank press of unusual size. This press is the largest of its type ever built by this company, exceeding by 26,000 lb. the press illustrated in *The Iron Age* January 6, 1910, which was the largest up to this time. This new press is interesting as showing a continually increasing tendency toward the building of larger and heavier presses, for manufactoring heavy sheet metal stampings to replace articles previously made of castings, or for such heavy stampings as were formerly made in hydraulic presses, the crank press giving a more uniform production, coupled with economy in manufacture. Fig. 1 is a front view of the press, while Fig. 2 shows the rear and gives an idea of the arrangement of the gearing.

The press is of the built-up type, and the four large vertical tie rods receive all the strain and relieve the frame columns of the pressure exerted in operating the tool. The cross sectional area of these columns is very large and they serve to impart great rigidity to the entire

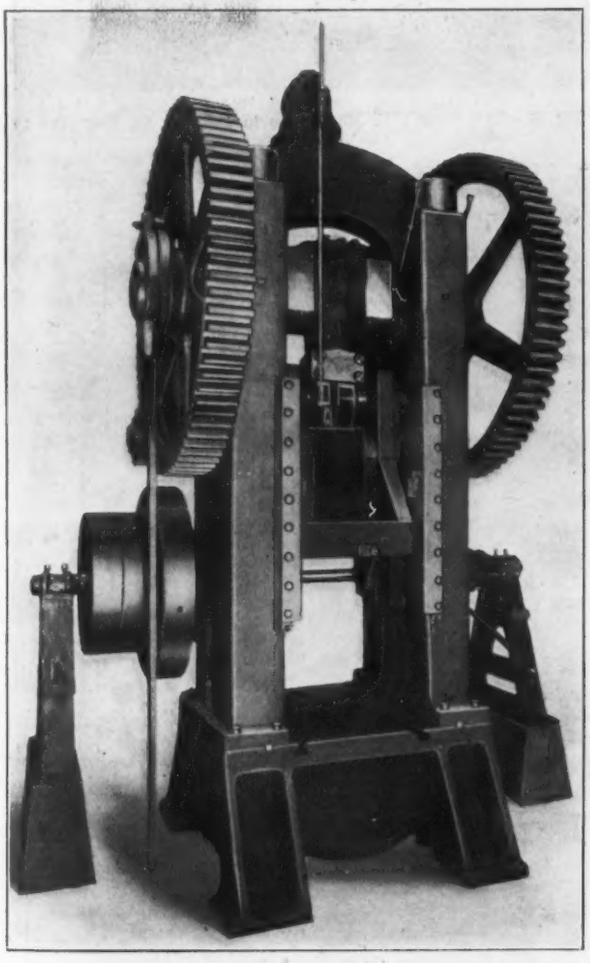


Fig. 1.—An Exceptionally Large No. 80½ Press Built by the E. W. Bliss Company, Brooklyn, N. Y.

press. The crank shaft is 16 in. in diameter and weighs 9500 lb. The press previously described had only a 15-in. shaft. Power is transmitted to the shaft at both ends, thus greatly reducing the bending strain on the shaft and equalizing the pressure on the journals and gears. On account of the great size and weight of the slide a 4-hp. electric motor mounted on top of the press is employed to raise and lower it, the power being transmitted from the motor to the worm and worm wheel adjustment through a vertical shaft fitted with knuckle joints. When the tools are doing their work the slide is practically guided throughout its entire length in the gibs. The press is triple geared and the train is made up of cut steel gears and pinions, each of the large main gears weighing about 13,000 lb.

A lever operating a powerful friction clutch of a new type, especially designed for heavy duty, controls the machine. By the use of this clutch the press is always under instant control and can be stopped and started at any point of the stroke. A safety coupling attached to the wheel acts as a safety guard in case the press is

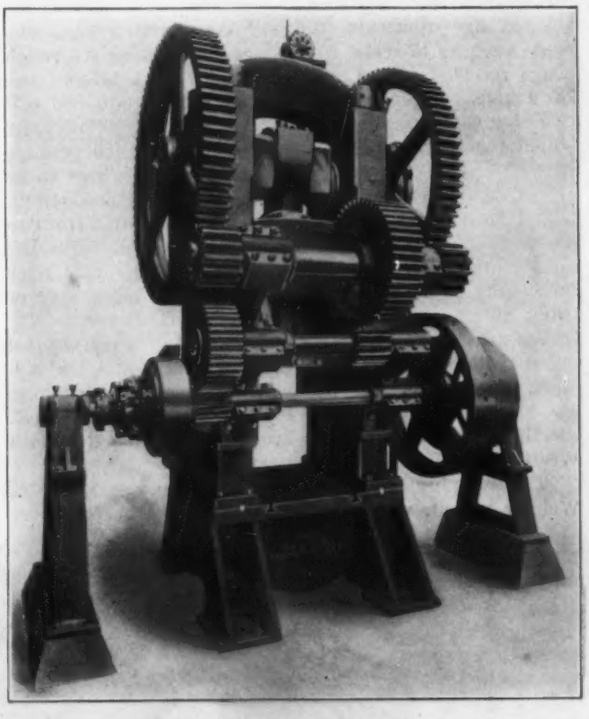


Fig. 2.—Rear View, Showing the Arrangement of the Gears.

subjected to a pressure greatly in excess of that for which it is designed.

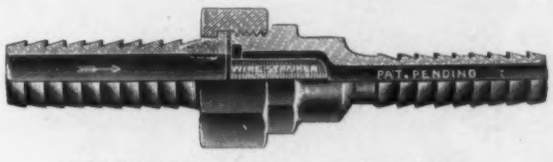
The following table gives the principal specifications and dimensions of the press:

Width of bed, inches	50
Depth of bed, inches	62
Overall hight, inches	235
Floor space, inches	200 x 120
Diameter of crank shaft, inches	16
Weight of crank shaft, pounds	9,500
Weight of main gears, pounds	13,000
Weight of press, pounds	190,000

This machine is fitted with a cam actuated bottom knockout, which is not clearly shown in the engravings.

The Quix Pneumatic Hose Coupling Strainer

In the use of pneumatic tools considerable difficulty has been experienced in permitting loose pieces of foreign matter to enter their delicate mechanism. To overcome this loss of time and expense of repairs the Quix combinational hose coupling strainer was designed as a safe-



The Quix Pneumatic Hose Coupling Strainer.

guard. It is a substantially made brass hose coupling (¾ x ½ in.), fitted with a renewable and easily cleaned wire strainer. The strainer is deep and cup shaped, with ample area between its sides and the inner walls of the male end, so that an accumulation of dirt will not reduce the air current until the strainer is nearly filled. It is manufactured by Franklin Williams, manufacturer of engineering specialties, 39 Cortlandt street, New York.

A New Weimer Cinder Car

The latest product in cinder car construction, designed by Edgar A. Weimer and built by the Weimer Machine Works Company, Lebanon, Pa., is the result of experiments conducted at the several furnaces of the Carnegie Steel Company by the designer, with the cooperation of the steel company's engineers. Special attention has been given to the sources of weakness developed by experience and the construction has been made such as to resist heavy wear as well as the rough usage received at the hands of cinder bank labor. The car frame, as shown in Fig. 1, consists of two end and two side castings mortised into each other and securely bolted together. The removal of parts is thus possible without difficulty when repairs are made. The racks are of an improved type and are separate steel castings, bolted to the end frames. The bale is fitted to two heavy gear wheels, which have very large self-cleaning teeth and are slipped over spuds on the bale. This gives practically a solid steel casting, with the advantage of being able to remove the parts subject to wear. The trucks are of extra heavy construction, with rolled steel wheels, McCord dust proof journal boxes, Simplex bolsters, Ajax brake beams, and the latest Westinghouse air brake rigging, with a brake shoe on each wheel. Sterling automatic couplers are used in connection with Westinghouse friction draft gear.

The dumping mechanism is the well-known Edgar A. Weimer patent, which gives control of the ladle in its different dumping positions, only the moving of a valve lever being required for the operation. A feature of the dumping mechanism is that the ladle can be made to dump from either side, as shown in the positions of the cylinder in Figs. 2 and 3, and provision is made so that it is impossible to tilt it backwards or in the wrong direction while the mechanism is being changed. This change can be made in 30 seconds and requires the use of no tools or wrenches. The ladle is locked securely by a simple device, automatic in action, and without the

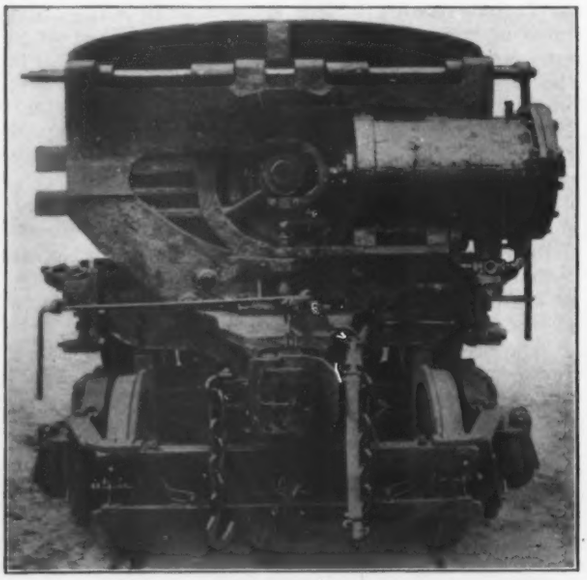


Fig. 3.—End View with Mechanism in Position for Dumping to the Left.

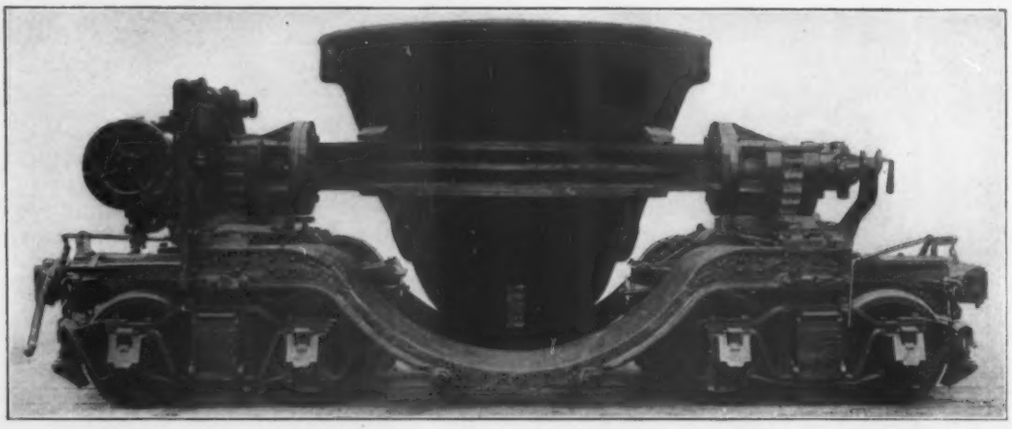


Fig 1.—The New Weimer Cinder Car.

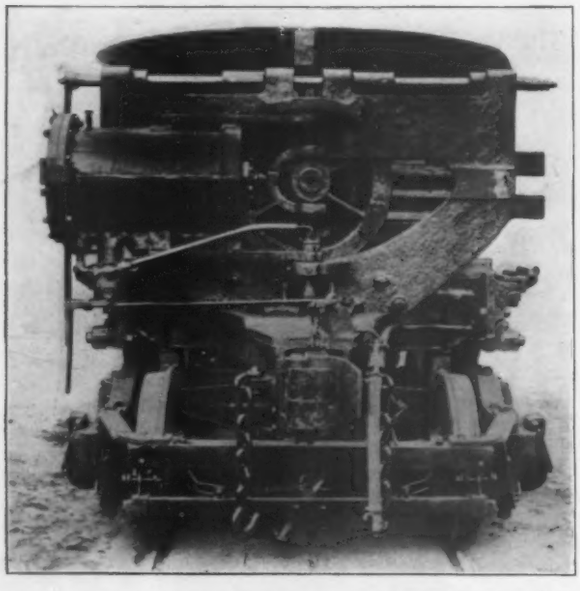


Fig. 2.—End View Showing Mechanism in Position for Dumping to the Right.

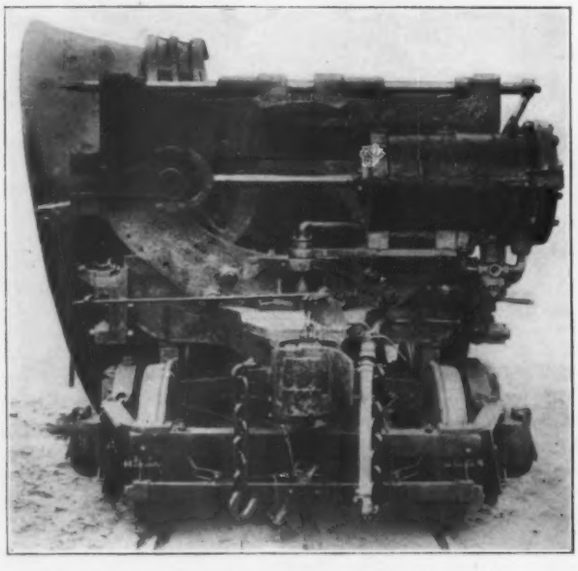


Fig. 4.—Ladle Dumped to the Left.

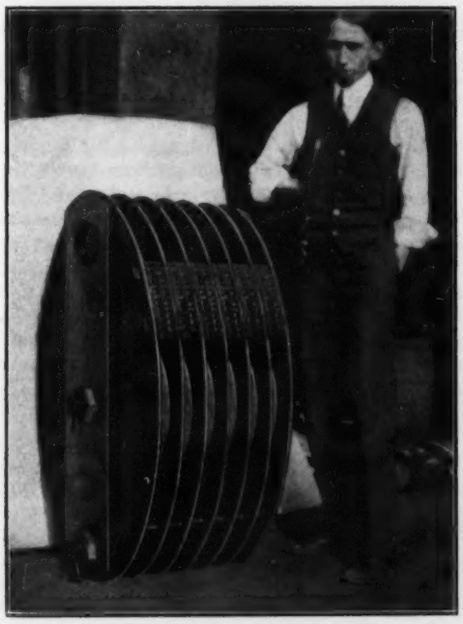
use of springs or weights. The final dumping position, the ladle being thrown well outside the track, is shown in Fig. 4.

The ladle has a capacity of 260 cu. ft. of cinder when filled to within 6 in. of the top. It can be easily removed from the car frame, being provided with lugs with holes for crane hooks. This removable feature is particularly of value in open hearth steel operations, as any number of ladles may be placed in tripods at the furnaces and filled with slag from numerous tappings, then picked up by the crane and placed on the cinder cars to be hauled to the dumping ground. The new Weimer car is of sufficiently heavy design to enable it to handle chilled as well as liquid cinder. Hoods are placed over the tilting and controlling mechanism of the car when in service, for the general protection of those parts, but they have been left off in the accompanying illustrations so that the construction of the working parts may be shown. The car of which views are given is one of a number being built for the Duquesne furnaces of the Carnegie Steel Company.

The Patterson Six Sheave Steel Block

The W. W. Patterson Company, 54 Water street, Pittsburgh, Pa., has recently completed what is said to be two of the strongest and heaviest six-sheave blocks ever made. Aside from the great strength of the blocks, the safe working load being 125 tons, another special point of interest is the record time made in furnishing them, which was one week.

These blocks were furnished for the Seaboard Construction Company, Philadelphia, Pa., and are to be used for the topping lift of a large derrick car having a capacity of 50 tons. As the length of mast was 20 ft. and the boom 50 ft., it was necessary to attach a standard triple block to the bottom of each of these six-sheave



A Six-Sheave Steel Block Made by the W. W. Patterson Company, Pittsburgh, Pa.

blocks, thus giving the effect of two nine-sheave blocks, which is a novel way of reaving up tackle.

All the plates in the blocks were ½ in. thick, and the side straps are ¾ x 8 in. in section. No shackles are furnished with the blocks, but they are attached to the car by head pins 4½ in. in diameter. The diameter of the sheave pin is 3 in., and that of the bottom bolt to which the triple block is attached is 2½ in. The sheaves are bushed with Metalline and are grooved for ⅞-in. plow steel cable. The weight of each block is 1804 lb.

Musconetcong Furnace of the Musconetcong Iron Works, Stanhope, N. J., is being relined.

The Cleveland Horizontal Boring Mill

Recent improvements made by the Cleveland Machine Tool Works, Cleveland, Ohio, in its horizontal boring, milling and drilling machine, which was illustrated in *The Iron Age* July 1, 1909, include the lengthening of the bed and the equipping of the machine with a constant

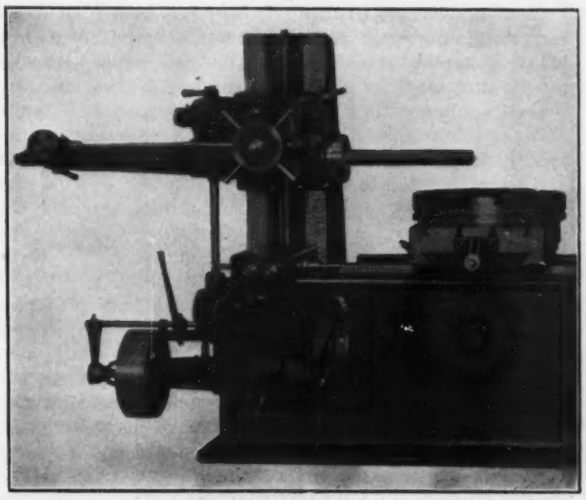


Fig. 1.—Front View of the Horizontal Boring Mill Built by the Cleveland Machine Tool Works, Cleveland, Ohio.

speed motor drive. Fig. 1 is a front view of the machine and Fig. 2 is a rear view showing the application of the motor drive. The principal feature of the machine aside from its simplicity of design is the convenience with which it may be operated. All of the handles are located within easy reach of the operator from his usual working position and only one handle is moved in making a complete change in either the feed or the speed.

The box bed, which is very deep, is reinforced by internal ribs, which make a foundation unnecessary. In

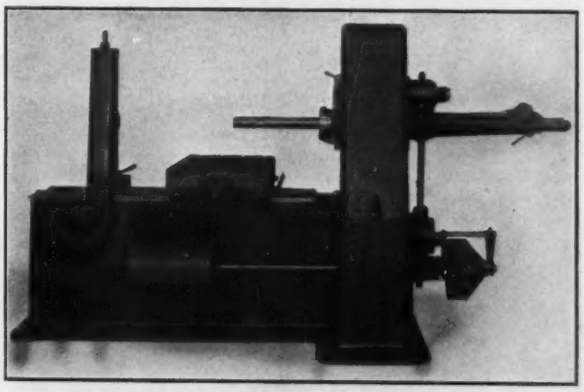


Fig. 2.—Rear View of the Combined Boring, Drilling and Milling Machine, Showing Arrangement of Motor Drive.

the new machine the maximum distance from the face plate to the outboard support is 6 ft. 10 in., which is 28 in. longer than in the previous machine. The motor supplied is a 3-hp. constant speed motor running at 1135 rev. per min., the necessary speed changes being accomplished through the gear box at the left end of Fig. 1.

The Van Dorn & Dutton Company, Cleveland, Ohio, has opened a Canadian sales office in Montreal. The office is located in the Eastern Townships Bank Building and is in charge of R. E. T. Pringle, who will look after the sales of the company's various products, which include hard service electrically operated drills and reamers, street railroad supplies, including the Van Dorn gears and pinions for all standard types of street railway motors, and armature, field and induction motor coils and commutators. The company expects to cover the Canadian territory more thoroughly than it has in the past.

Haniel & Lueg Steam-Hydraulic Forging and Bending Press

American Manufacturing Rights Acquired by the Mesta Machine Company

For many years hydraulic power has been used in an increasing number of ways in industrial and other plants. Many different branches of industries have been extended and made profitable by the use of new and improved appliances operated by hydraulic power. Haniel & Lueg, Dusseldorf, Germany, are well-known manufacturers of steam-hydraulic forging and bending presses and they have recently made arrangements with the Mesta Machine Company, Pittsburgh, Pa., whereby the latter secured the exclusive manufacturing rights for the United States and Canada. Fig. 1 shows one of these presses with the overhead steam intensifier and Fig. 2 is a view of a beading press with two movable cross heads, while Fig. 3 shows a dishing press for handling circular or other shapes of plates.

The special advantages claimed for these presses are a constant power connection between the steam intensifier and the press ram, the production of accurate work, high efficiency, ability to vary the pressure and a simple and compact arrangement of the various parts. The first of these is the most important and gives the presses their name—steam-hydraulic. The press cylinder and the hydraulic balance cylinders are kept filled with water from the reservoir tank by compressed air. In this way the steam pistons and the piston rod of the steam intensifier are forced back to their highest initial position after each stroke, avoiding clearance and unnecessary steam consumption. The rod of the steam piston serves as the press ram, and as it rests on water, which is kept

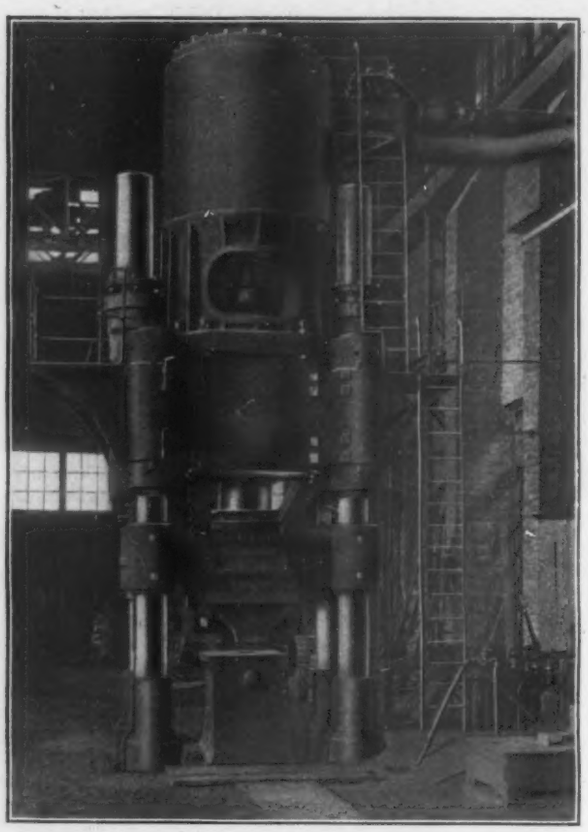


Fig. 1.—The Haniel & Lueg Steam Hydraulic Forging Press Built by the Mesta Machine Company, Pittsburgh, Pa.

under a constant pressure, any advance of the piston causes the ram to move simultaneously.

The movement of the press ram toward the work is produced by discharging steam from the drawback cylinder, while at the same time steam is admitted into the intensifier. As the steam piston advances under the influence of this steam the piston rod compresses the water and produces the high hydraulic pressure, which is transmitted to the forging by the large ram. Pressures up to 10,000 lb. per square inch can be generated in this way, and the design of the press is such that the pressure can be regulated within these limits. With this design the generating of the high hydraulic pressure and its transmission to the press ram takes place in a closed space, thus doing away with any necessity for high pressure pipes or valves. On the completion of the work the press ram is lifted by admitting steam into the drawback cylinder. As a result of the constant power connection between the steam intensifier and the press ram,

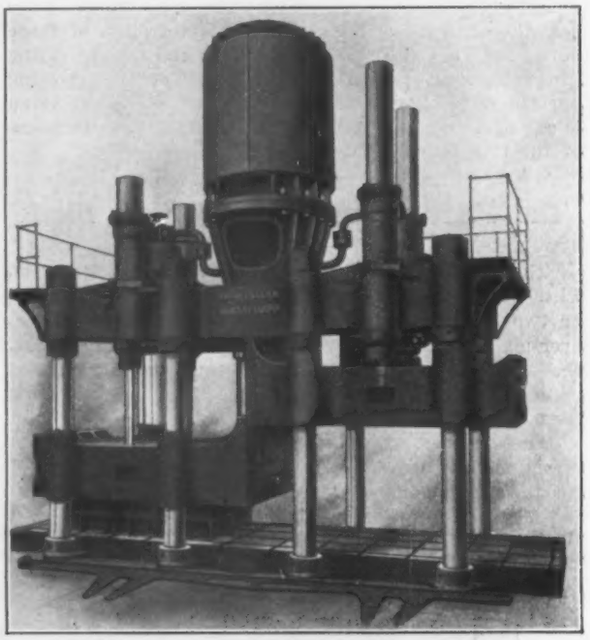


Fig. 2.—The Steam-Hydraulic Bending Press with Two Crossheads.

the steam consumption is small, while the movement of the ram is easy and can be readily controlled. The water used to produce the hydraulic pressure always remains within the press chamber. This feature possesses the advantage of not requiring new water supply, and the liquids which may be placed therein to prevent freezing are not lost.

Although Fig. 1 shows the press with an overhead steam intensifier, if the hight of the forge shop is not enough to enable this type to be erected presses can be furnished with the steam intensifier located at the side, although the former arrangement is preferred on account of space economy. The working of both types of presses and the efficiencies are the same. The standard sizes in which these presses are built range from 100 to 15,000 tons pressure, with a steam pressure of 100 to 150 lb. per square inch, but other sizes to operate at other pressures can be built. This type of press can be used for all forging work and more especially for large pieces, such as guns, armor plate, marine engine shafts and also for manufacturing large shells.

Other types of presses built include a steam-hydraulic beading press, shown in Fig. 2, for making stampings up to 33 ft. long. This press has two movable cross heads, which can be coupled together or operated separately. The dishing press, shown in Fig. 3, embodies in its construction the same principles as the other two presses and is designed for flanging the entire circumference of circular or other shaped plates, such as steam boiler rims, firebox, flue and smokebox sides for locomotives, at one pressure. Specially shaped dies enable the ends to be made exactly the required shape and size. When the press is to be used for flanging out flue and fire door frames a special hydraulic cylinder is fitted below the lower press table and works upward. While the presses illustrated are intended for handling large work, a smaller press, known as the Express forging

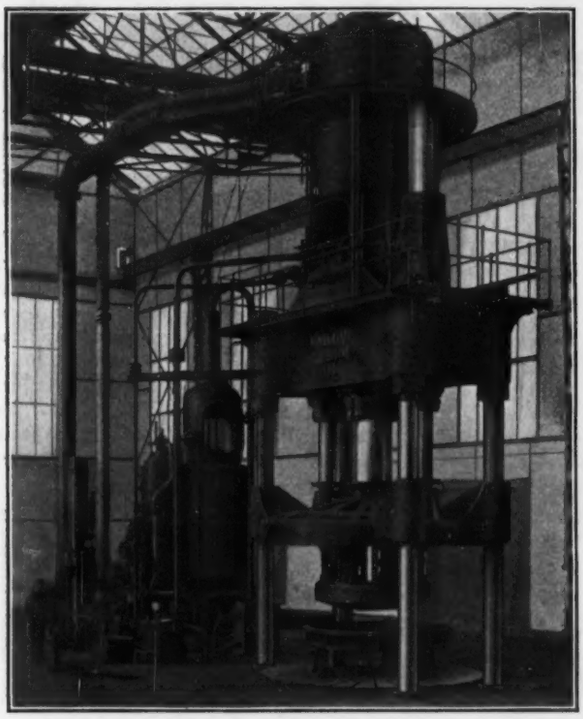


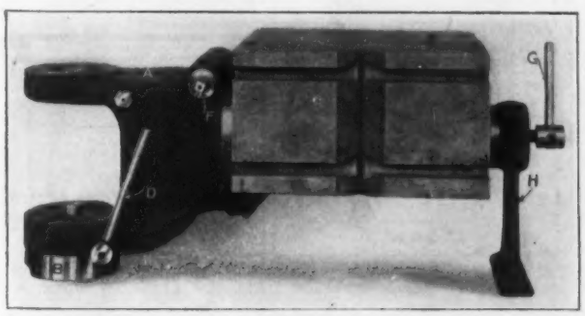
Fig. 3.—Dishing Press for Plates.

press, which is not shown, is built for small forging and die work. The frame of this press is of the overhung type, which gives it the advantage that freedom of motion in operation is not hindered by columns. This press is built in five sizes, ranging from 100 to 500 tons pressure.

The Morris Swiveling Radial Drill Table

A worm swiveling table is regularly supplied by the John B. Morris Machine Tool Company, Cincinnati, Ohio, to its line of plain radial drills.

The lower end of the radial column supports the upper lug of the forked casting A, which is bored to fit on it, while the lower end of the casting is supported on the plug B, which is doweled and bolted to the base of the machine in correct alignment with the column. The plug and that portion of the casting which bears upon the column of the drill are made in halves, both parts being bolted together, while the stud and lever D clamps



A Worm Swiveling Table for Radial Drills Made by the John B. Morris Machine Tool Company, Cincinnati, Ohio.

the casting A and keeps it from swinging with the column. The box table E swivels upon this forked casting and is adjusted in position by the worm formed upon F, this worm engaging with the worm wheel secured to the box table which has a circular portion graduated from both sides of zero to 90 degrees. A V is planed in one side of the swiveling table for convenience in clamping cylindrical work and the top of the table is bored in the middle to receive a circular table. After the swiveling table has been set in its proper position it may be securely locked by the clamp handle G. To prevent the outer end of the table from deflecting when heavy strains are imposed upon it the stand H, bearing upon the base of the machine, is provided.

The Hill Rolling Mill Bearing

The Hill Clutch Company, Cleveland, Ohio, has recently added the rolling mill type of bearing, which is made in sizes ranging from 6 to 14 in., to its line of

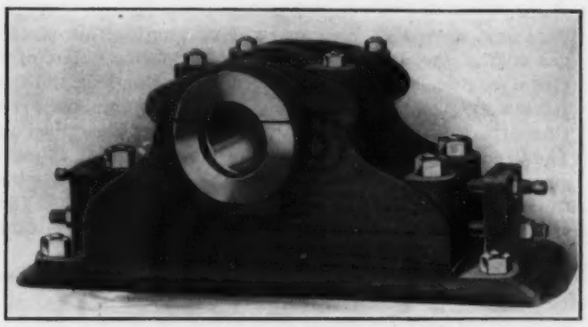


Fig. 1.—The New Rolling Mill Bearing Made by the Hill Clutch Company, Cleveland, Ohio.

heavy power transmission machinery. Fig. 1 shows the bearing complete, while Fig. 2 is a view with part of the covering broken away, showing the manner of lubricating it.

These bearings are constructed for any kind of heavy duty service and are designed to give correct bearing length, large area and great oil reservoir capacity. In this bearing a fixed collar is used instead of depending upon a loose ring or chain to convey the oil to the journal. The lubricant, which is stored in large reservoirs

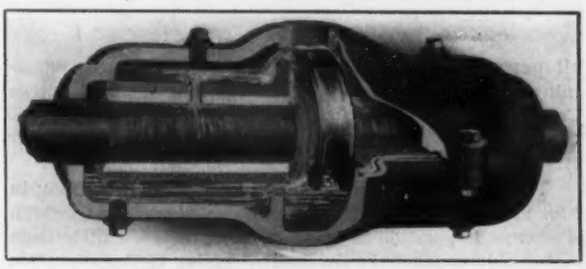


Fig. 2.—The Hill Collar Oiling Bearing.

in the bottom, is elevated continuously and positively to the top of the reservoirs by a heavy split collar clamped to the shaft, and from this point the oil flows by gravity over the entire bearing surface. The bottom reservoirs have partitions, which insure the settlement of any dirt or grit, and the oil can be drained off by removing the screw plugs. After only a few revolutions of the shaft the bearings are flooded with oil, while with other types of line shaft bearings it is claimed that it is necessary for the shafting to be in operation for some time before enough oil is conveyed into the journal to lubricate it, and during this period the wear on the babbitt metal is excessive and the power loss is large.

The Welding Company.—The Autogenous Welding Equipment Company, Springfield, Mass., has recently opened plants for the repair of broken parts of all descriptions, making a specialty of automobile work, such as frozen cylinders and broken aluminum cases, at 62½ Church street, Hartford, Conn., and at Southampton street, junction with Massachusetts avenue, Boston, Mass. The three plants are to be operated on a uniform condition, and as all bills will be rendered from the home office at Springfield there will be a uniform system of charging and a uniform guarantee on the work. These plants are also headquarters for the sale of the Davis-Bournonville Company's high pressure positive mixture welding equipments. Owing to the difficulty of remembering the word "autogenous," the company has adopted as an abbreviation or trade name "The Welding Company."

A New German Gas Engine

Details of the Double-Acting, Four-Cycle Engine Built by Ehrhardt & Sehmer*

Ehrhardt & Sehmer, Schleifmuhle, near Saarbrucken, Germany, have developed a new double-acting four-stroke gas engine, the design of which closely follows that of a steam engine, as will be noticed from the longitudinal section given in Fig. 1. Like the gas engine built by this firm for the Cargo Fleet Iron Works, described in *The Iron Age* August 9, 1906, the main parts of the engine are concentrically fitted together, which distributes the stresses evenly and parallel to the main axis of the cylinder. Another advantage of this arrangement is that all parts are readily accessible, which facilitates examining the engine and the proper working of all its parts. Care has been taken to make it easy to clean or replace those parts of the engine which are likely to suffer from dust or dirt.

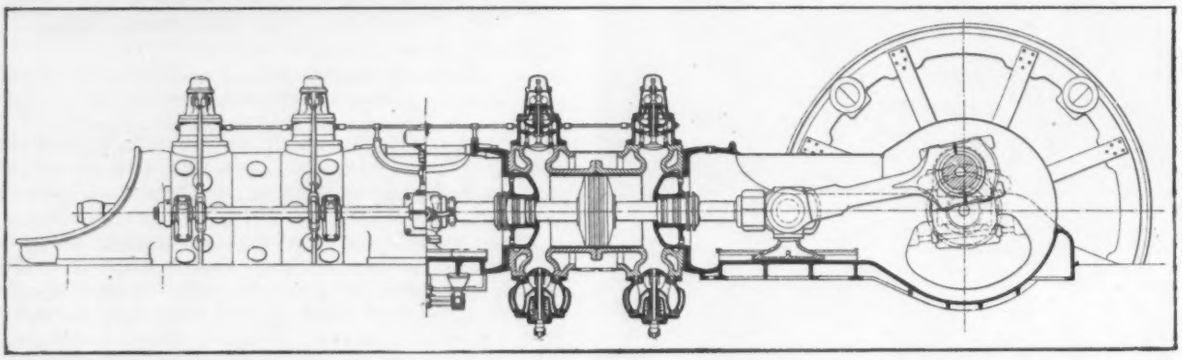


Fig. 1.—Longitudinal Elevation, Partly in Section, of the New Four-Cycle Gas Engine Built by Ehrhardt & Sehmer, Germany.

The cylinder casting is in two parts, as shown in Fig. 2, to eliminate casting and heating strains, which is always impossible in a one-piece cylinder, and is thus better able to meet the demands peculiar to the operation of gas engines. Within the cylinder is a steel sleeve forming the piston rubbing surface, and a second steel sleeve around the outside at the middle incloses the water jacket. The inner sleeve is held in place by a flange between the two connecting flanges of the cylinder castings. The sleeve is of hard material, to resist wear, but when it does become worn it can be replaced easily and at little expense. The bolts joining the two halves of the cylinder are easily accessible by removing the jacket sleeve. These bolts have to withstand the same forces as the cylinder head bolts, but, for the sake of safety, they are made stronger.

The caulking of the joint is principally effected by the shrunk fit between the inner sleeve and the castings, but copper caulking is also provided in the joint, which can be renewed without having to dismantle the cylinder. The jacket band is forged and in two parts. It is light in weight and easily removed. Externally this cylinder looks like the one-piece cylinders formerly used, and as its general dimensions are the same it is readily interchangeable with them. Compared with the cylinder, of which a half is shown at the right of Fig. 2, and has no inner sleeve, this new cylinder has the advantage that its joint is caulked perfectly by the shrunk inner sleeve, and that the connecting bolts of the two halves of the cylinder are easily accessible. Both types have advantages in comparison with a one-piece double walled cylinder. For example, the half of the cylinder shown in Fig. 2 is double walled only for the distance *a*, which is about one-sixth of the total length, and only the portion

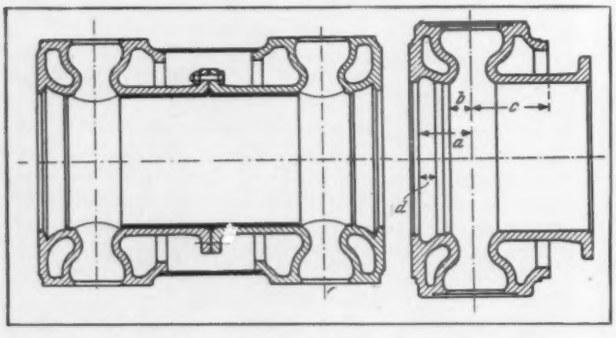


Fig. 2.—Details of the Cylinder Construction.

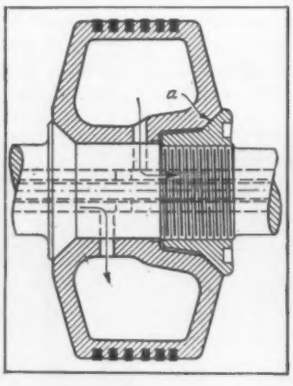


Fig. 3.—The Latest Form of Piston.

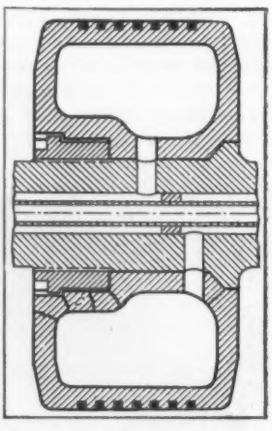


Fig. 4.—An Older Form and One of Its Defects.

b becomes warmer than the same section of the outer covering. In the part *c* the outer and the inner walls are completely separated, and consequently can expand and contract independently of one another. By this construction and also by the decidedly lessened weight, which is not half that of a one-piece cylinder, the casting and heating strains are materially decreased, and there is the added advantage that if a break occurs in one half it is not necessary to replace the entire cylinder.

Where the inner cylinder joins the head the strength is further increased in the construction shown by leaving the rough skin on the casting on the part *d;* in earlier construction this part was machined when the cylinder was turned, and considerable was cut away for the cyl-

* Mainly translated from *Stahl und Eisen.*

inder cover bolt holes. In the new construction these are placed in a special flange. The greater simplicity of the one-piece, double-walled cylinder is more than offset by its disadvantages. The new two-piece cylinder in operation has fulfilled expectations. It is especially noteworthy that the greater heating of the inner cylinder compared with the outer one has been reduced, because the steel inner wearing sleeve serves as a protection. Actual operation has, moreover, shown that the explosion pressures cause no visible movement at the junctions of the jacket covers. From a comparison of these observations it may be concluded that the unequal expansions, due to heat changes, impose greater strains on the cylinder than the explosion pressures do in cylinders made in several parts. In smaller engines, where these strains and the heat expansion are of relatively less importance, the one-piece cylinder is the proper type.

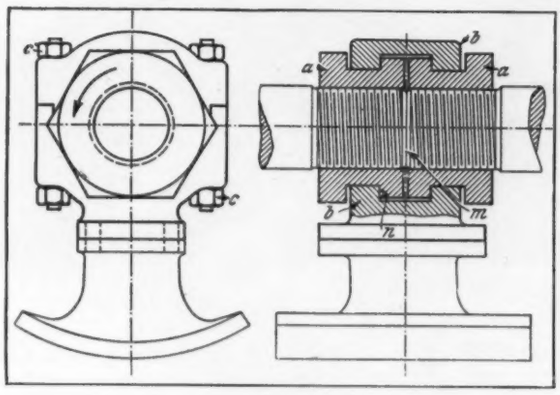


Fig. 5.—Details of the New Piston Rod Coupling.

If larger units than hitherto customary are needed in gas engines, or if greater efficiency is required from the cylinders, the use of steel instead of cast iron is recommended for the cylinder halves. Experience has demonstrated that with proper molding steel has been proved by tests to be very suitable for the cylinders of gas engines.

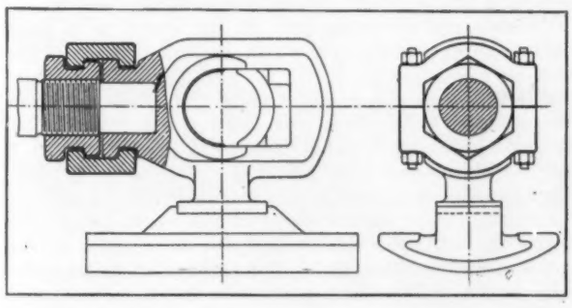


Fig. 6.—Details of the New Connecting Rod Coupling and Cross Head.

In the endeavor to make the piston as short as possible a new type, shown in Fig. 3, has been developed. The clamping surface of the piston is at *a* and is counterbored to correspond in form with the taper of the clamping nut. By this construction all sharp corners are avoided; the head being strong and powerful, without superfluous metal, and the piston itself being firmly secured without any increase of length. The broad tapered shoulders on the piston rod and this nut now effectively support the cross bars *c*, Fig. 4, which hitherto were weakened by incisions and were not supported.

The piston rod coupling now used between cylinders by Ehrhardt & Sehmer is shown in Fig. 5. It consists of two nuts *a*, into which are fixed two half couplings *b*, concentric with the nuts and held together by bolts *c*. The two nuts are first screwed up on the piston rods and then the rods are pushed together, so that they touch. The two half couplings are next placed around the nuts

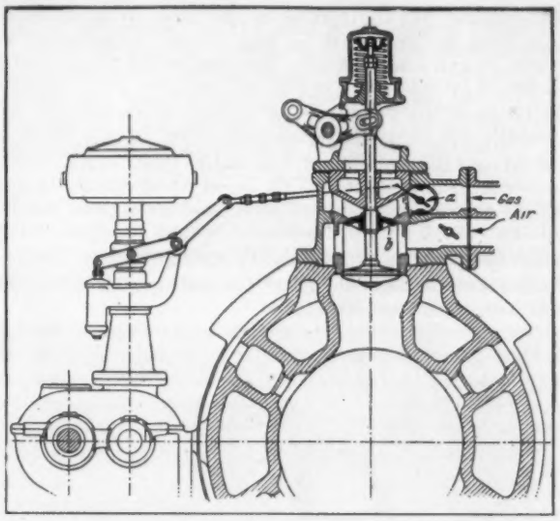


Fig. 7.—Details of the Governor and Regulating Valves.

a and *a*, and are clamped together by the bolts *c*. To give this joint the necessary tension, which is the first condition of the strength of such a coupling, one of the nuts is turned in the direction of the arrow; the surfaces *m* and *n* are thereby brought into close contact and the coupling is complete. It is opened by turning one of the nuts *a* in the opposite direction, and then removing the two half couplings.

The special advantages claimed for this coupling are a minimum number of threads, easy and quick joining and separating, and a short length, as there is only one single nut of normal length on each rod. The bolt *c* may be comparatively light, because there is no great stress upon it from any tendency of the two coupling parts to separate.

The cross-head connection shown in Fig. 6 is similar to the piston rod coupling, and its application is apparent from the illustration, without further comment.

The most efficient engines burn the fuel mixture in very small space, and therefore in the shortest possible time. The time of burning is reduced by the intimate mixture of gas and air, and the best results are obtained if the gas and air are evenly introduced into the machine during the entire suction stroke. In the construction of gas engine governors it must be borne in mind that the four-stroke gas engine should have at its disposal gas and air in the desired quantity, and the only natural means of attaining as perfectly as possible the desired composition of the mixture is the throttling of the gas and air. In contrast to the steam engine, practically no loss of energy results from this throttling in the gas engine, because the latter is supplied with chemical, not mechanical, energy. In addition, care must be taken with the gas engine that no undesired mixtures of gas and air take place during the pauses between strokes. During this time the conduits must therefore be separated from each other. In order that the governor may be able to properly fulfill its function, the back pressure of the governor must be as small as possible and the adjusting gear always free.

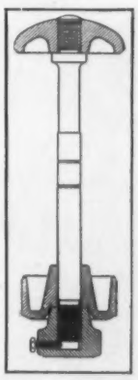


Fig. 8.—Exhaust Valve.

The requirements for the design of a suitable gas engine governor are in short: Throttling through the entire suction stroke, separation of the gas and air conduits from each other during the intervals between strokes and the avoidance of high back pressure and of the catching of the adjusting gear. In most governors hitherto constructed the regulation of the volumes to be mixed and the separation from each other of the two conduits are combined in a single instrument. This seems to be

very simple, but the reverse is the case. A governor of this kind is illustrated in Fig. 7, the construction of which is extremely simple. For regulating the quantity of gas to be conducted to the cylinder there is a throttle valve, *a*, controlled by the governor. The gas and air conduits are separated from each other by the valve *b*, placed on the spindle of the main inlet valve. This governor, it is said, fulfills its object as efficiently as any other, however complicated and expensive. The special mixing valves, situated beside or behind the inlet valve, with their more or less complicated motion derived from the actuating shaft, and the rods which cannot be watched, have been eliminated.

In operating with this governor gas engines driving electric generators, great regularity in running, hitherto only attained in exceptional instances, is secured in cases of change of load; the governor immediately responds, since it is absolutely free from back pressure, and the masses to be moved are small. With this governor on gas blowing engines, even small machines, it is possible to reduce the speed to extents that were formerly impracticable. A 900-stroke gas blowing engine can be set for 22 to 110 rev. per min. without there being at hand either a gas receiver or other special contrivance.

With the increase in the size of the engines Ehrhardt & Sehmer have gradually extended the use of a special type of uncooled exhaust valve, which is shown in Fig. 8. As far back as 1905 2000-hp. tandem gas engines were equipped with exhaust valves of the same type as the inlet valves, which have given satisfactory service.

The Moller Oval Chuck

For the elliptical turning of dies, hubs, chucks, molds and patterns, such as there is particular use for in the manufacture of sheet metal articles, J. A. Moller, New Rochelle, N. Y., has developed an interesting oval chuck for lathes. It is especially constructed to meet the requirements of manufacturers of kitchen utensils, silver ware and fancy goods. Fig. 1 is a view of the chuck as it appears on a lathe and Fig. 2 the chuck partly unassembled.

Referring to Fig. 2, the part still shown on the lathe is the stationary fixture and the part laid over on the bed of the lathe is the part which, in turning, revolves and presents the work to the cutting tool. In designing this chuck the inventor has sought to construct one with which an oval can be turned as quickly as a round. The

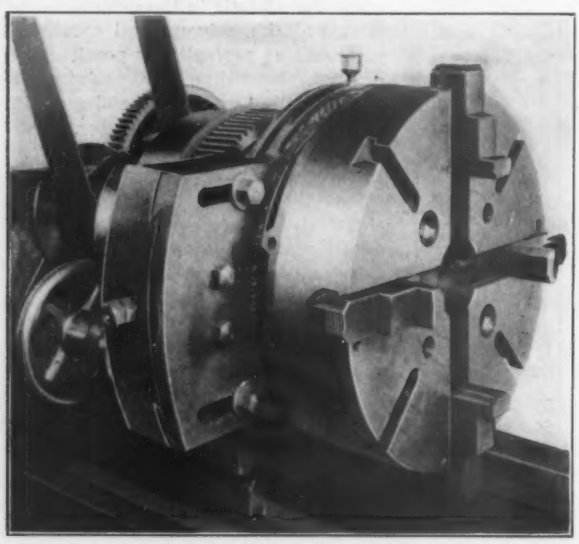


Fig. 1.—A New Lathe Chuck for Turning Elliptical Work Invented and Made by J. A. Moller, New Rochelle, N. Y.

same chuck without being removed from the lathe can be converted into a plain round chuck and in that condition is declared to have some advantage over an ordinary independent chuck. This lies in the fact that the chuck has a supporting ring at the back, which gives additional bearing surface, contributing to rigidity and well enabling it to handle work which frequently weighs as much as 200 lb.

By turning the hand wheel, Fig. 1, or the crank, Fig. 2, the amount of eccentricity can be varied by moving the

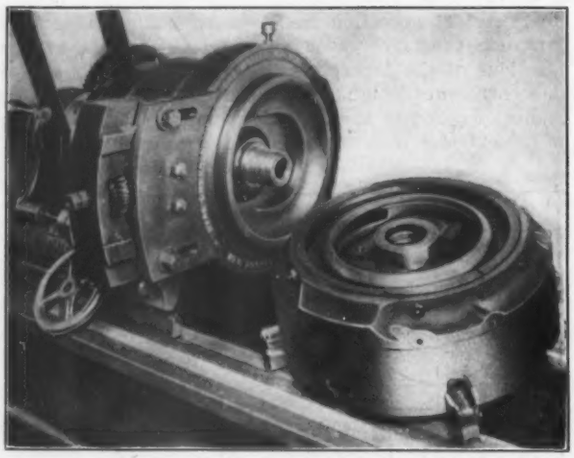


Fig. 2.—The Moller Oval Chuck Partly Unassembled.

eccentric ring on the cross slide through the screw and worm gear arrangement shown. By this means a difference between the major and minor axes of an ellipse can be obtained of anything between 0 and 4 in. The chuck itself is 15 in. in diameter and has four independent face plate jaws. The anchor slide with the gear box and the eccentric slide, straddles the spindle, has long bearings and is rigidly constructed. The worm screw shaft protrudes from the gear box parallel with the main spindle of the lathe and is arranged for either hand or power feed. With this adjustment geared to the lathe spindle oval forms with irregular surface contours can be turned, requiring, of course, simultaneous manipulation of the longitudinal feed of the lathe carriage. This is especially valuable in turning out dies with different ovals and obtaining a geometrically perfect shape of the design.

Within the revolving part of the chuck is a plate having lateral movement, which is threaded to fit the nose on the lathe spindle. This part obviously remains concentric with the spindle while the chuck revolves. Transversely to the movement allowed this plate and in the same plane is another movement, so that there is effected a universal joint allowing the drive to be transmitted to the face plate jaws while they revolve in elliptical paths. The central plate of the chuck being held concentric with the spindle and the back plate of the chuck eccentric with it, by the contact of its recessed ring fitting the projecting ring on the eccentric cross slide, through the universal joint connection before described, the outer part of the chuck carrying the face plate jaws is given the eccentric motion. So substantial is the construction and so simple the mechanism that the chuck can be revolved at comparatively high speed and elliptical work turned with practically the same speed as round work. Adjusting the eccentric slide so that it is concentric with the spindle transforms the chuck into an ordinary round turning chuck.

Shot Iron and Hard Spots in Castings.—In *The Iron Age* of October 6, 1910, page 800, it was stated that Thos. D. West, 10,511 Pasadena avenue, Cleveland, Ohio, solicits specimens of iron castings containing globules in gas cavities, solidly incased shot iron, white iron inside of gray or soft iron, and hard streaks or spots. As these phenomena are rare and more specimens are desired, the time for their receipt has been extended to March 1, 1911. A paper on this subject will be presented by Mr. West to the American Foundrymen's Associations convention at Pittsburgh in the week of May 23, 1911. Where requested, the names of firms sending specimens will not be mentioned in the paper.

The Blashill & Gray Barb Wire Machine

A new type of machine for manufacturing barb wire has been placed on the market by Blashill & Gray, London, Canada. The product of this machine is a single strand coiled spring wire, with the barb coiled around it instead of the two-strand twisted type, where the barb is held in place between the strands. Fig. 1 is a general view of the machine and Fig. 2 shows the machine with the barb feeding mechanism swung back, while Fig. 3 is a front view of the main rolls with the barb feeding rolls removed. The principal point of difference between the product of this machine and the other types now on the market is that the required length of barb is first cut, which is contrary to common practice, formed afterward as it passes through the machine, and is finally pressed solidly home between rollers of a special form. In this way the barb itself requires very little wire, as it is made with one wrap only and pressed into special shape to hold it solid.

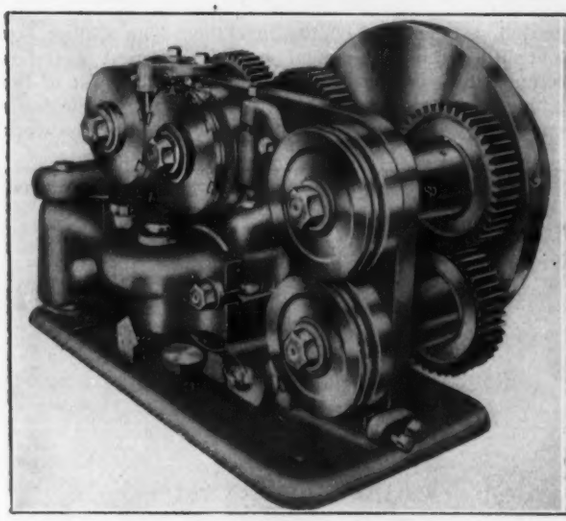


Fig. 1.—General View of the Machine.

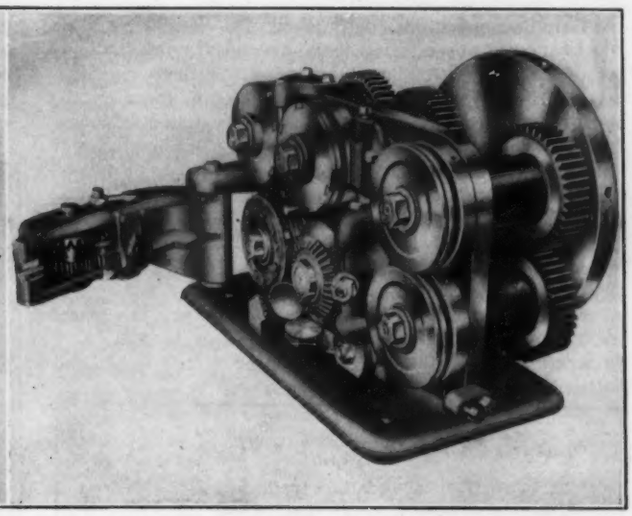


Fig. 2.—Barb Feeding Mechanism Swung Back.

Two Views of a High Speed Rotary Barb Wire Machine Made by Blashill & Gray, London, Canada.

In the operation of this machine the strand of wire passes between the rolls A and B, Fig. 3, which flatten it slightly at intervals to form seats for the barbs. The cutters C act against a stationary cutter on the barbing feed roll arm. The piece of wire for forming the barb is next forced by the strand wire into the pockets and the grooves G of the roll E by the tongue F on the roll D, which causes the barbs to assume the form of a staple. The strand carries these staple shaped barbs in the pockets in the roll E for half a revolution and then passes between the finishing rolls H and I. In their passage around the rolls the legs of the staple shaped barbs are crossed by the hard steel disks J. The thin, hard steel disk K spreads these points further apart, while the roll L, acting against the roll E, completes the wrap, and the two finishing rolls press the barbs solidly on the flattened spot on the strand, thus giving an extremely simple and perfectly continuous motion.

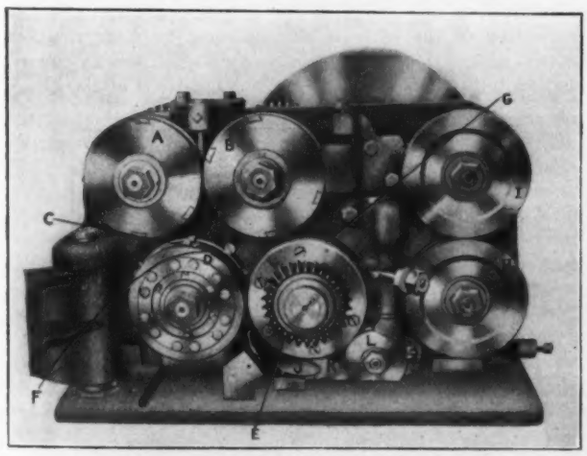
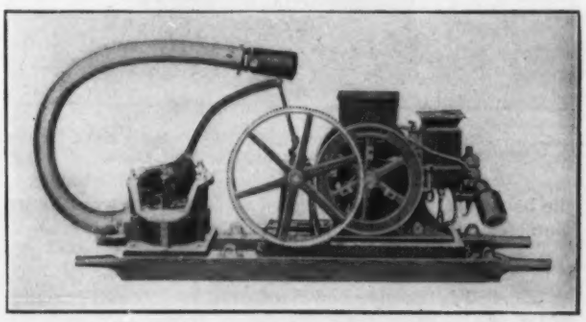


Fig. 3.—Front View of Main Rolls with Barb Feeding Rolls Removed.

The Douglas Contractors' Diaphragm Pump

W. & B. Douglas, Middletown, Conn., has designed a self-contained pumping outfit for the use of contractors or as a bilge pump for vessels. It is also used extensively by public service corporations for drainage and sewage work and where pumps of large capacity are operated by unskilled labor. The special feature of the pump is its ability to move large quantities of gritty water at a low price and to make the unit easily movable from place to place it is mounted on a frame that can be easily handled by four men. The pump is of the diaphragm type and is driven by a gasoline engine. Its capacity is 3000 gal. per hour and it is said to operate on a gallon of fuel per day. All the parts of the engine are inclosed and the gasoline tank, water jacket, carburetor, muffler, batteries, spark coil and switch are all grouped around the engine. The weight of the pump and engine when crated for shipment is 650 lb.



A Self-Contained Gasoline Driven Diaphragm Pump Made by W. & B. Douglass, Middletown, Conn.

The Scott-Madden Iron Works Company, Rushville, Ind., has signed a contract with the Marion Commercial Club, Marion, Ind., by the terms of which it agrees to combine its two plants now located at Keokuk, Iowa, and Rushville, Ind., into one central plant in Marion, providing the citizens of that city will subscribe for preferred stock in the company to the amount of $30,000. At the present time the two plants are manufacturing brick and tile machinery, but it is proposed to embark in the manufacture of steam shovels and dredges.

The Pratt & Whitney Automatic Cylindrical Sizing Grinder

Rapid Production of Accurate Work Coupled with Convenience in Operating Is the Keynote of the Design

Grinding machines, considering the length of time that they have been in use, have developed more than any other machine tool. Two large groups of these machines are in use at the present time. One of these is the surface grinder and the other is the cylinder grinder, both of which have been developed by the machine tool builders of this country. The latest machine to be turned out by the Pratt & Whitney Company, Hartford, Conn., is an automatic sizing cylindrical grinder, in which a number of devices have been embodied to produce accurate work rapidly and conveniently. Fig. 1 is a general view of the machine, while Figs. 2, 3 and 4 show the three principal automatic devices. These are the wheel feed and automatic sizing device shown in Fig. 2, a separate view of the latter being given in Fig. 3, and

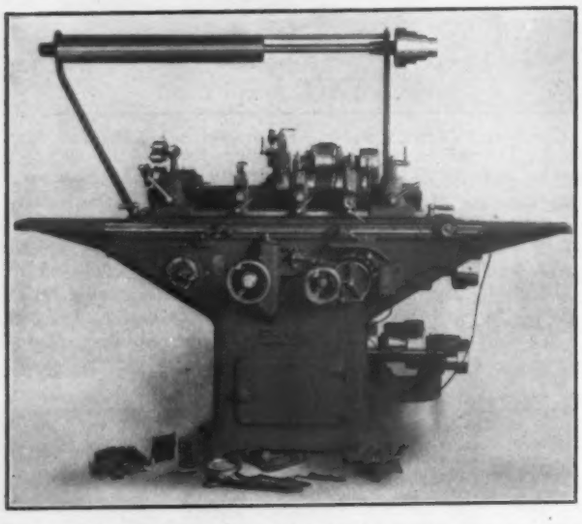


Fig. 1.—The Automatic Cylindrical Sizing Grinder Built by the Pratt & Whitney Company, Hartford, Conn.

the back rest, which is designed to follow the work as its diameter is reduced, illustrated in Fig. 4.

The Machine in Detail

The bed is massive and reinforced by internal bracing, while at the same time the design is compact and the various units are located so as to be readily accessible. It has wide bearing surfaces of both the V and flat types, which are oiled by rolls from reservoirs located in the body of the bed. A pan of liberal dimensions for collecting the water and receiving the chips surrounds the rear of the bed. It is easily accessible for cleaning and there is a cabinet in the base for the reception of the various appliances when they are not in use.

Like the vertical surface grinder which was illustrated in *The Iron Age* December 29, 1910, the work table is of the traveling type,and as it is slightly longer than the bed the traveling action tends to keep the alignment secured by the use of masters unchanged. To guard against inaccuracy, due to the table not traveling over the entire bed at all times, the former has been made very heavy and is ribbed to prevent warping and to resist torsional strains. The bearings are lubricated by rolls in the same manner as those in the bed and are protected at all times by guards. A pan cast integral with the table serves to collect and convey the water to the one surrounding the rear of the bed. Six changes of table feed are provided through a gear box which is located on the rear of the machine. The sliding key controlling the engagement of the different gears is actuated by levers which are located at the front of the grinder, within easy reach of the operator. These feeds are entirely independent of either the wheel or the work

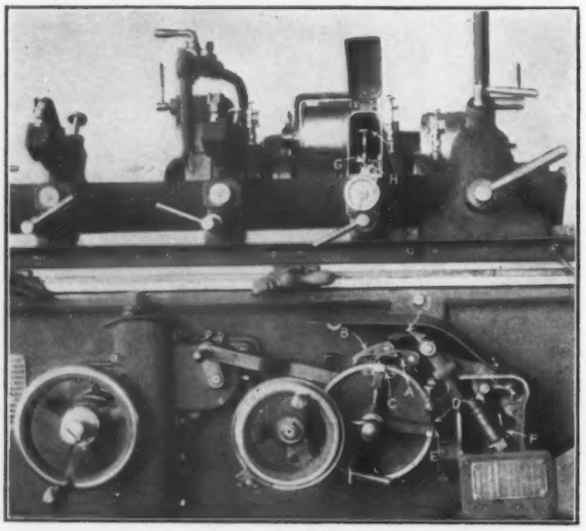


Fig. 2.—The Wheel Feed and Automatic Sizing Devices.

speeds and are instantly available while the machine is in operation. The reversing mechanism is also of the same type as that employed in the company's 6-ft. vertical surface grinder.

A swiveling table which is used for grinding tapers is furnished. The various attachments used with the grinder are clamped to this table, and the surface to which they are attached has a flat top with angular sides and is accurately made. A hardened and ground stud fitting a hardened and ground bushing in the work table and binders with handles conveniently located at either end maintain its relation to the main work table. Graduations are provided for grinding tapers, and the swiveling of the table is accomplished by a micrometer screw and dial. In use the head and tail stocks can be moved to accommodate the various positions of the table.

Fig. 3.—Side View of the Automatic Sizing Device.

without in any way disturbing the accuracy of the attachments clamped thereon.

The wheel base is stationary and is mounted upon the bed by dove tail bearings, having a taper gib to compen-

sate for wear. Although the wheel base is very heavy, it is nevertheless sensitive. Back lash in the feed screw is prevented by using a weight mounted on a roller, so as to secure the desired result without affecting the sensitiveness of the slide in any way. The overhead belt drive which tends to lift the base from its seat and also interferes more or less with the free action of the wheel slide has been eliminated in this grinder, giving a construction in which the slide is mounted directly upon the bed, which forms a direct support for the wheel. The wheel spindle is of hardened tool steel and the bronze bearing boxes are mounted in conical seats, so as to be easily accessible for adjusting, while at the same time they are both water and dust proof. The self-contained wheel mount holds the wheel firm and true and the spindle end has a key for positively driving the wheel mount. An endless belt with an automatic tightener is used for driving the spindle which possesses the advantages of doing away with the upward pull of the belt, while at the same time the backward pull keeps the spindle tight against the inward side of the boxes and prevents the wheel from digging in if too large a lubricating space has been allowed. A two-step cone pulley on the base of the machine provides for two different wheel speeds. The downward pull of the belt transmitting the power to the endless belt while it tends to arrest the lifting action of the wheel base at the same time does not interfere with the free movement of the base, as the pressure is absorbed by a novel device, which consists of a hardened and ground roll in the slide traveling on a hardened and ground parallel in the bed.

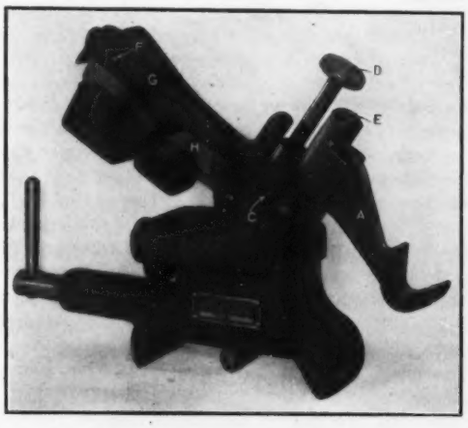


Fig. 4.—The Back Rest, Which Is Designed to Follow the Work as It Is Reduced.

The Automatic Sizing Device

The most important feature of the machine is the automatic sizing device, which will automatically grind any number of pieces regardless of the wear of the wheel. Both the roughing and finishing feeds are controlled and utilized, a feature that greatly increases the productive capacity of the machine and insures more accurate and uniform work, while at the same time one workman can operate two machines without the slightest difficulty. The wheel feed proper can be operated entirely independently of the automatic sizing device. The transverse movement of the wheel slide is obtained through a large screw and nut, and is accurately controlled by the feeding device through incased spur gears located on the back of the machine. The wheel feed can be operated either by hand or automatically and either in conjunction with or without the sizing device. When hand operation is used an adjustable stop assists the graduations on the feed hand wheel in controlling the movement of the slide. Separate feed pawls operating upon a ratchet control both the roughing and the finishing automatic feeds, and while these pawls are entirely independent of each other, they derive their rotating action from the same connecting lever. The feed movments range from one-half to 12 notches, corresponding to a reduction in the diameter of the work of from 0.000125 to 0.003 in., the exact amount being regulated by conveniently located adjusting screws. In order that the finishing pawl may take a one-half-notch feed when desired, it is made double. Both of these automatic feeds can be instantly engaged or disengaged by a knob or by the automatic sizing device.

In using the automatic wheel feed the roughing pawl A, Fig. 2, is set to feed any desired number of notches, and the finishing pawl B is also set. After this the disengager C is so located as to throw the roughing pawl out when the work has been reduced to within 0.001 in. of the finished size. In setting the disengager for the roughing pawl the set screw D should come against the stop E on the disengager, which has the effect of automatically maintaining the relation between the roughing and finishing pawls, so that the amount left for the finishing feed always remains the same regardless of the wear of the wheel. When the roughing pawl has been disengaged the finishing pawl continues to feed until disengaged by the magnet F, which is operated by a dry battery and disengages the fine feed pawl when the work has been reduced to the desired diameter. The automatic sizing device is operated electrically and the magnet remains inoperative on account of a break between the points G and H. The sizing lever I carries on the small projection shown in Fig. 3 a smooth pointed diamond, which bears against the work. As the diameter of the piece is reduced the lever drops until the points G and H, Fig. 2, are forced together. This completes the circuit and the fine feed pawl is instantly disengaged by the energizing of the magnet F, which releases the disengaging trip J. The sizing device is then put in its upper position, while new work is being placed in the machine. In setting this device it is only necessary to grind a piece to the required size, after which the proper adjustment of the sizing lever is determined by the micrometer screw and the dial governing the transverse adjustment of the device. This device is self-contained and its nature is very simple. It can be located in any position of the bed, as wire and outlets for the reception of the connecting plug on the front of the table are provided.

The head and tail stocks are clamped to the table by an eccentric binder. The work revolves on hardened and ground dead centers, the work driver being driven by gears. The piece may be stopped or started instantly by a clutch in the headstock, through which the driver is governed independently of the belt. Four speeds are provided by the four-step cone pulley and drum and are entirely independent of the table or wheel speeds. The cone pulley and the drum are finished very accurately and balanced, which eliminates vibration. The drum belt is tightened and loosened by a conveniently located belt tightener on the headstock. The tailstock spindle is operated by a rack and pinion and is kept under spring tension, which is controlled for the various classes of work by a nut.

The Backrests

Backrests of the automatic positive feeding type of entirely new and original design are used. The operation of the backrest will be understood from an examination of Fig. 4. The arm A, which supports the work, is held in contact with it by the weighted lever B, fulcrumed in the frame, against the adjusting screw D at the point C and causes the arm to slide in an upward direction on the pin E. As the lever B is depressed a roller, F, travels down into the V-shaped space formed by the upper surface of the lever and the lower surface of the casting G, this roller preventing any upward movement of the lever and as a consequence any movement of the backrest away from the work. Both radial and vertical adjustments are made by adjusting screws and the backrest may be very easily removed from the bed by a slight inward pressure on the eccentric binder, which serves to release the binding clamp.

The following table gives the principal dimensions and specifications of the grinder:

Maximum distance between centers, inches	30
Swing over bed, inches	4
Maximum taper, inches per foot	2
Diameter of grinding wheel, inches	12
Minimum width of grinding wheel, inch	½
Maximum width of grinding wheel, inches	1¾
Diameter of hole in grinding wheel, inches	5
Maximum diameter of wheel spindle bearing, inches	$1^{13}/_{16}$

Minimum diameter of wheel spindle bearings, inches	1¾
Length of wheel spindle bearings, inches	5
Number of grinding wheel feeds	2
Minimum grinding wheel speed, revolutions per minute	1,890
Maximum grinding wheel speed, revolutions per minute	2,980
Number of work speeds	4
Minimum work speed, revolutions per minute	100
Maximum work speed, revolutions per minute	384
Diameter of countershaft pulleys, inches	12
Width of countershaft pulleys, inches	5¼
Belt width, inches	3
Speed of countershaft, revolutions per minute	410
Number of table feeds	6
Minimum table feed, inches per minute	21
Maximum table feed, inches per minute	101
Minimum wheel feed, inches	0.000125
Maximum wheel feed, inches	0.003
Floor space, inches	128 x 46¼
Net weight, pounds	4,000
Domestic shipping weight, pounds	4,350
Foreign shipping weight, pounds	5,100
Capacity of box, cubic feet	180

The equipment regularly furnished with the machine includes an automatic sizing device, one emery wheel, one wheel truing device, a center grinding attachment, two universal backrests, 36 backrest shoes (two for each ¼ in. from ¼ to 2¼ in.) and 16 work dogs, having the same variation and the same range, a set of wrenches and a countershaft.

The overhead shafting has been done away with in this machine, and if desired it can be furnished with a motor base to accommodate any 5-hp. constant speed standard motor.

The Pittsburgh Iron Trade in 1910

BY ROBERT A. WALKER.

It would be hard to imagine a greater difference than that found in the condition of the iron trade at the close of 1909 and at the end of 1910. Mills and manufacturing plants all over the country closed the year 1909 with a greater volume of business on their books than ever before in their history, and hopes were high that 1910 was going to be one of the best years in every way that the iron trade had ever known. How badly those hopes were blighted is now a matter of history. The activity that marked the closing months of 1909 was short lived and the year just closed has been one of the most trying the trade has ever known, particularly the last half. Two reasons are given for the unsatisfactory year; first, the restricted purchases by railroad companies, and, second, the fact that the country was not able to absorb the heavy increase in the output of iron and steel arising from the large additions that had been made to producing capacity. In the last half of 1910 there was a steady slowing down of operations and the year closed with the mills working to about 50 per cent. of their capacity. All through the year distributers and consumers were placing orders cautiously, and only for such quantities of materials as were necessary to maintain stocks and fill current needs. There was little disposition to buy ahead, except by agricultural implement manufacturers, and 1910 closed with consumers' stocks of all kinds of manufactured iron and steel probably lower than ever before in the history of the iron trade. In the last half of the year orders were almost invariably accompanied with the request to ship out promptly, showing the low condition of stocks.

In spite of the restricted buying, and the fact that all the mills through the year were keen for orders, prices on finished iron and steel were fairly well maintained by reason of co-operation between the leading producers until the last three or four months of the year, when they commenced to give way to some extent. This resulted in a series of meetings of makers of sheets, tin plates, bars, plates and structural steel in Pittsburgh in December, at which it was decided to try to hold present prices, the belief being that early in 1911 the demand would show material betterment.

There were no important failures in the iron trade in 1910, and the year was almost entirely devoid of labor troubles. The strike in the sheet and tin plate mills of the American Sheet & Tin Plate Company was officially declared off on August 27 by the Amalgamated Association, and all the company's plants are now on a nonunion basis. The bar iron, sheet and tin plate scales of the Amalgamated Association were settled in 1910 without any trouble, but this labor organization has its scales signed by very few mills in the Pittsburgh district. It has lost ground steadily for some years.

Pig Iron

The decline in the price of pig iron was about $4 per ton, the greater part of which came in the second half of the year. In the Pittsburgh district proper there was on December 31, 1909, a total of 50 blast furnaces, all of which were then in blast, while at the end of 1910, out of 53 furnaces (three new ones having been added by the Jones & Laughlin Steel Company), 13 were idle and several others were preparing to go out. Indications are that there will be a further marked decrease in the output of pig iron not only in the Pittsburgh district, but in other pig iron centers as well.

The year 1910 opened with an active demand for Bessemer iron, with prices ruling firm, at $19, Valley furnace. In this report all prices named are at Valley furnace, the freight rate to Pittsburgh being 90 cents a ton. Early in February a decline started and the month closed with the price weak, at $18. In the first week in April the price was $17.50, a decline of $1.50 a ton in the first three months. By July 1 Bessemer iron had reached $15.50, and from that time on the market held fairly steady until October, in which month the price went to $15. In November some sales were made for delivery in the first half of 1911 at $14.60, but this price prevailed only for a week or two, the Valley furnacemen holding a meeting in Cleveland early in November and decided to maintain the market at $15. Stocks of pig iron in the valleys are heavy.

Basic iron began the year at $17 and closed with the market ruling $13 to $13.25. The demand in the first half of the year was fairly heavy, but in the last six months was dull, and several times the market went under $13, at furnace, sales having been made as low as $12.85 and $12.90.

In January, 1910, No. 2 foundry was held at $17, this being the high price of the year. On April 1 the market had declined to about $15.75, and when July 1 was reached the price was weak, at $14.50, at furnace. In October the price had declined to $14. During November and early December this grade of iron sold as low as $13.50, and the year closed with dealers and furnaces quoting about $13.75.

Only a comparatively small tonnage of gray forge iron is used in the Pittsburgh district, as there are few puddling plants in this city, most of the forge iron used here coming from the valleys, while some comes from Kittanning and Dunbar. The year opened at about $16.50, but the price steadily declined through the year, and in November and December sales were made at $13.

The table given below shows average monthly prices of Bessemer, basic, No. 2 foundry and gray forge iron, f.o.b. Valley furnace, as follows:

Average Pig Iron Prices f.o.b. Valley Furnace, in 1910.
(Add 90 cents per ton for delivery in Pittsburgh district.)

Month.	Bessemer.	Basic.	Gray forge.	No. 2 foundry.
January	$19.00	$16.87	$16.50	$17.00
February	18.44	16.41	16.12	16.62
March	17.70	16.00	15.25	16.10
April	17.38	15.94	15.18	15.62
May	16.62	15.19	15.00	15.25
June	15.70	14.70	14.25	14.70
July	15.50	14.50	13.62	14.31
August	15.15	14.10	13.35	14.15
September	15.00	13.62	13.25	13.75
October	14.94	13.15	13.25	13.67
November	14.92	13.20	13.15	13.85
December	15.00	13.37	13.00	13.75

Steel Billets

In the first half of 1910 the demand for steel billets and sheet and tin bars was fairly active, but in the second half of the year the finishing mills slowed down their operations, owing to the falling off in business, and as a result the demand for steel also fell off, prices showing a steady decline. There were no material additions to steel capacity in the Pittsburgh district during 1910, it becoming evident very early in the year that the capacity for making both Bessemer and open hearth steel was amply large enough to meet the demand.

The year 1910 opened with prices on Bessemer billets ruling at $27.50 and open hearth at $28, while sheet and tin bars for the first quarter were $29 and forging billets about $31. These prices continued in effect until early in April, when the market commenced to decline, Bessemer billets then ruling at about $27 and sheet and tin bars $28 to $28.50. At this time open hearth billets were scarce and were commanding a premium of about $2 over Bessemer, being held firmly at about $29, Pittsburgh. Prices continued to rule on this basis during the second quarter, but by the first week in July Bessemer billets had declined to $25, sheet and tin bars $26, open hearth billets $27 and open hearth sheet and tin bars $28. By the first week in October Bessemer billets had declined to $24 and open hearth to about $24.50, while Bessemer and open hearth tin bars were held at about $25. By November 15 Bessemer and open hearth billets were being freely offered at $23.50 and Bessemer and open hearth sheet and tin bars at $24.50.

In the early part of December the leading steel mills held a meeting and fixed prices of Bessemer billets at $23 and Bessemer and open hearth sheet bars at $24.50, f.o.b. Pittsburgh, full freight to destination added. This price basis was afterward changed to $23 on Bessemer and open hearth billets and $24 on Bessemer and open hearth sheet bars, Pittsburgh or Youngstown, freight to destination added. Forging billets ruled in the last week in December at $28. The year closed with these prices in effect, but with very little steel moving. In the last two months of the year there was a marked slowing down in steel operations, and the year closed with the output about 60 per cent. or less of the billet capacity.

Finished Iron and Steel

The year 1910 in the steel rail trade was a distinct disappointment, orders received from the leading railroads being much smaller than expected and fewer in number. The year opened with standard sections ruling at $28, and this price was maintained until November 1, at which time the leading rail companies decided to quote rails on the per pound basis, the price of standard sections being fixed at 1.25 cents, equal to $28 per gross ton of 2240 lb., the old figure. The same arrangement was made in prices of light rails, 12-lb. rails being quoted at 1.25 cents, 16, 20 and 25 lb. at 1.21 cents, 30 and 35 lb. at 1.20 cents and 40 and 45 lb. at 1.16 cents, these prices being f.o.b. at mill, plus freight to point of delivery. At no time during 1910 was the Carnegie Steel Company able to operate in full its three Edgar Thomson rail mills at Bessemer, operations ranging during the year from 30 to 50 per cent. of capacity.

The demand for other kinds of finished material during the first half of 1910 was fairly active, but in the second half was dull, declining steadily in the last three or four months. Concessions in prices were being freely made in October and November, and it became evident some concerted action would be necessary to hold the market, as previously referred to. The consuming trade felt that conditions were artificial to some extent and for this reason bought very cautiously during the last half of the year, placing orders only for what was absolutely wanted to meet current needs.

Prices on beams and channels up to 15-in. in January were 1.55 cents at mill, and this price ruled until the first week in March, when the market softened to about 1.50 cents. This price continued in force until late in June, at which time it declined to 1.45 cents. In July the price declined to 1.40 cents and held at this figure for the remainder of the year, with intimations that in exceptional cases, and to meet competition in certain districts, 1.40 cents was shaded as a basing price.

The demand for plates in the first half of the year was fairly active, there being considerable carbuilding, but in the second half there was a steady decline and in the last three months the market was very dull. In the first week in January ¼-in. and heavier plates were quoted at 1.55 cents, and this price held fairly well until about the first week in May, when they were quoted at 1.50 cents, but were weak at this price. In the first week in June the price declined squarely to 1.45 cents, and in the latter part of that month to 1.40 cents. This price on ¼-in. and heavier plates held fairly strong for the remainder of the year, being shaded only in exceptional cases.

When the year opened the new demand and specifications on contracts both for iron and steel bars were heavy and all the mills were more or less behind in shipments. In many cases steel bars for prompt delivery were bringing a premium. This condition continued practically through the first half of the year, some of the leading makers of steel bars being at times three to four months back in shipments. In the last half of the year the demand slowed down and specifications against contracts fell off to some extent, so that the mills were able to catch up on back deliveries. In January steel bars ruled at about 1.45 cents, at mill, for forward delivery, while for prompt shipment 1.50 to 1.55 cents was being quoted. Common iron bars at this time were firm, at 1.65 to 1.70 cents. In the early part of August weakness in prices developed, steel bars being then quoted at 1.40 cents and iron bars at 1.45 cents. This price on steel bars was shaded to some extent during October and November, but about December 15 the makers held their meeting and decided to hold to 1.40 cents, and the year closed with this price ruling. On common iron bars, however, prices declined, and at the close of the year they were selling as low as 1.35 cents.

The year began with the demand for black and galvanized sheets very active, while on blue annealed and electrical sheets the mills were much behind in deliveries, and these grades were bringing premiums of $2 to $3 a ton over regular prices for prompt delivery. In the first week in January No. 28 black sheets were quoted at 2.40 cents and No. 28 galvanized 3.50 cents. These prices held firmly until about July, but at this time the demand had fallen off and the mills were actively seeking orders, No. 28 black sheets being quoted as low as 2.25 cents and No. 28 galvanized as low as 3.25 cents. In the first week in September No. 28 black sheets had declined to 2.15 cents and No. 28 galvanized to 3.20 cents. In the latter part of November the sheet trade was in very unsatisfactory condition, the demand being light, and prices were freely shaded. On No. 28 black as low as 2.10 cents was being done, and on No. 28 galvanized 3.20 cents. On December 7 the meeting of makers of black and galvanized sheets was held and it was decided to make a strong effort to maintain the market on the basis of 2.20 cents for No. 28 black, one-pass cold rolled sheets, and 3.20 cents for No. 28 galvanized. At the close of the year all the mills were quoting these prices, and the tone of the market was firm, but there was no improvement in demand.

The market on tin plate, both as regards demand and maintenance of prices, probably made a better record than any other form of finished iron and steel. The

year opened with 100-lb. cokes selling at $3.60 per base box, for delivery through the first half of the year. In September the tin plate trade commenced to feel the effects of the depression in other lines and there was a slowing down in demand and in specifications. The price of $3.60 was still in effect, but it was claimed that on some very desirable contracts placed in November it was not strictly observed. At the meeting of the tin plate makers in December the price of $3.60 was reaffirmed. In the latter part of November and early in December some very large contracts were made with the meat packers and can makers for delivery through the first half of 1911. During the year there was a very material addition to tin plate capacity. The Jones & Laughlin Steel Company completed and put in operation 10 hot mills at Aliquippa; the Phillips Sheet & Tin Plate Company completed its new plant at Weirton, W. Va., containing 10 mills, and later added 10 more mills, making a total of 20, and the McKeesport Tin Plate Company added 10 mills to its plant at McKeesport, Pa. The American Sheet & Tin Plate Company also started work in the summer on its new plant at Gary, Ind., which will contain upward of 60 hot sheet and tin plate mills.

The demand for hoops and bands was fairly active through the year. Prices were well maintained, hoops being quoted in the first week in January at 1.50 to 1.55 cents for forward delivery and 1.60 to 1.65 cents for prompt shipment. Steel bands were 1.45 to 1.50 cents. These prices were practically unchanged until the summer, steel hoops being quoted in the first week in July at 1.50 to 1.55 cents and bands at 1.40 to 1.45 cents. The year closed with these prices still in effect. The only increase in new capacity in the Pittsburgh district was made by the Sharon Steel Hoop Company, which added some new mills in the latter part of the year.

The year from all standpoints was fairly satisfactory in the merchant pipe trade, the demand being quite active through the whole year. Some very heavy contracts for large pipe for gas and oil lines were placed. A new card of Pittsburgh basing discounts was put in effect January 1, and was well received by the trade. On October 1 the leading makers issued a new card of Pittsburgh basing discounts, the main changes involving a material reduction in extra strong and double strong pipe and a smaller reduction in butt weld merchant pipe, and a slight increase on some sizes on lap weld pipe. In the early part of October the makers of iron pipe issued a new card of discounts which was four points lower than on steel pipe, or, in other words, an advance of $8 a ton on iron pipe was asked over steel. Indications are that there will be a very heavy demand for large pipe for oil and gas lines during 1911, as a good many projects are now under way, some of which, no doubt, will soon materialize. During the year the Youngstown Sheet & Tube Company made some large additions to its pipe mill capacity and added two new butt weld furnaces and a new lap weld furnace. In June the Republic Iron & Steel Company started up a lap weld furnace in its new plant at Lansingville, near Youngstown, and later on started a second.

The Philadelphia Iron Trade in 1910

BY AUGUST A. MILLER.

The iron trade entered 1910 under most auspicious circumstances. Production was at an unprecedented rate, orders in hand were heavy and a record breaking year was anticipated. Induced by the extreme activity in the demand at the close of the previous year, productive capacity was being largely increased, only to have a most distressing influence on trade conditions later, when developments showed that expectations as to the year's volume of business were not to be realized. Even at the beginning of the year there was a growing belief that we were going at too rapid a pace, unless consumptive requirements grew proportionately, and with legislative action unfavorable to corporate interests, particularly the railroads already under way, this was thought by conservative interests improbable.

The production and prices of both crude and finished materials showed a steady decline throughout the year, although at times unsuccessful efforts to stem the downward movement were made. As the year advanced and prices went steadily downward, curtailment in production was plainly the only remedy, but it was late in the spring before any decided action was taken. Blowing out of furnaces under existing conditions was not an easy task. Heavy purchases of ore, made in anticipation of a continued demand, had to be taken care of, and it was not until late in the year when Eastern consumers were able to defer heavy shipments of foreign ore that furnaces were able to restrict production to any marked extent and check the further accumulation of stocks on furnace banks.

The steel works and rolling mills, having heavy orders on their books early in the year, did not feel the full effect of the depressed conditions until toward summer, when many of the contracts on hand were about to expire. As the hoped for betterment failed to be realized in the fall there was a gradual reduction in activity and toward the close of the year few plants were able to maintain a rate better than 50 per cent. of their full capacity.

Iron Ore

Notwithstanding curtailments in deliveries of foreign ore, by which a large portion of the purchases made for this year's shipment will be carried over into 1911, the importations at the port of Philadelphia will exceed previous records. Statistics completed for arrivals during 51 weeks of the year show a total importation of 1,133,245 tons, valued at $3,315,423, as compared with 992,036 tons, valued at $2,559,760, in 1909. Curtailments and cancellations of orders for foreign ore, due to arrive at this port during 1910, for consumption largely by Eastern producers of pig iron, have been roughly estimated at 300,000 tons. During the last half of the year ore buying was practically at a standstill.

Pig Iron

At the beginning of the year practically every furnace available in this district was in operation, with production establishing new records. During the first six months the productive rate varied, decreasing, however, in the second quarter. In the last half, and particularly the last quarter, the decline was more rapid. Eastern merchant furnaces were able to maintain a fairly active rate of operation, owing to large sales early in the year, covering deliveries well into the third quarter. As these became gradually cleaned up curtailment became more rapid. The statistics of the Eastern Pig Iron Association show that the orders in December of this year were a little less than one-half of the total unfilled orders in January, the usual result of a falling market. The stocks of iron on hand increased from a little over 50,000 tons to about 100,000 tons at all the furnaces represented. While these figures show an increase, it is interesting to note that the total stocks in January, 1910, amounted to just one week's capacity, and that those in December are a trifle less than two weeks' output of the entire capacity of the furnaces represented by membership of the association. The Virginia Pig Iron Associa-

tion statistics, covering 21 furnaces in that district, show a decline of about 42 per cent. in unfilled orders in December, as compared with January; stocks on furnace yards increased practically 27 per cent. during the same period.

In January standard brands of eastern Pennsylvania No. 2 X foundry iron were quoted at $19, delivered in this vicinity, with the full 50-cent differential for No. 2 plain grades. Basic was moving freely at $18.75, delivered, for second and third quarter shipment. Gray forge iron commanded $17.75 and standard low phosphorus $22.75 to $23.25, delivered. In February lower prices were available and checked heavy buying. Consumers for some time made purchases only for near future needs. Southern iron was freely offered, but at prices so close to those of Northern brands that buying was at no time particularly active. During the first half of the year the average minimum price for No. 2 X eastern Pennsylvania foundry iron declined $2.35, basic $2.65 and gray forge $2.65 a ton; standard low phosphorus pig, the production of which is confined to but a few furnaces, showed an average decline of but 19 cents during the same period. In the second half price fluctuations were less pronounced. From July to December eastern Pennsylvania No. 2 X foundry showed a decline of $1.15; Virginia No. 2 X, 85 cents; basic, $1.35; forge, $1.27, and standard low phosphorus, 60 cents. Toward the close of the year buying dragged, and the amount of iron sold for forward delivery was extremely light. Producers reached a point late in the year at which the average orders on hand no longer showed a profit, and little effort was made to force business. Buyers of basic iron will, in many cases, carry considerable over from purchases for third and fourth quarter delivery and, therefore, showed little interest in further purchases for early 1911 requirements, although some little prompt iron was bought late in the year, in order to reduce average costs for crude materials.

The accompanying table shows the average range of minimum prices by months for the principal grades of pig iron delivered in buyers' yards, eastern Pennsylvania and nearby points:

Average Prices of Pig Iron Delivered in Buyers' Yards, Eastern Pennsylvania and Nearby Points, in 1910.

	Pennsylvania No. 2 X foundry.	Virginia No. 2 X foundry.	Standard gray forge.	Basic.	Low phosphorus.
January	$19 00	$19.00	$17.75	$18.75	$22.81
February	18.69	18.50	17.50	18.50	23.00
March	18.00	18.10	16.90	18.25	23.00
April	17.75	17.94	16.62	17.56	23.00
May	17.00	17.19	16.00	16.88	23.00
June	16.65	16.75	15.65	16.10	22.90
July	16.25	16.37	15.37	15.69	22.56
August	16.00	16.06	15.00	15.12	22.50
September	16.00	16.00	14.75	15.00	22.50
October	15.81	16.00	14.50	15.00	22.50
November	15.69	15.90	14.38	14.75	22.50
December	15.50	15.80	14.25	14.75	22.40

Finished Iron and Steel

Quite a large amount of plate business was carried over from 1909; prices were well maintained, and early in the year makers were not inclined to contract heavily for forward shipment. As the demand became easier prices were reduced $1 per ton, from 1.75 cents for ordinary plates, delivered in this territory. In April better deliveries were available, and the demand, following a further reduction of $1 per ton in June, became more active, but was not maintained. More reductions in price followed. In July prices were lowered $1 and in August $1 more, to 1.55 cents, minimum, but failed to bring out aggressive buying, consumers purchasing largely for prompt delivery only, or for business in hand. While mills showed a trifle more activity during the summer months, the demand fell off gradually, and toward the end of the year few of the Eastern mills averaged better than 50 per cent. of normal capacity. After August practically no change in quotations was made, although reports of possible concessions were occasionally heard. At the close of the year business was practically at a standstill, with consumers looking for price concessions after the turn of the year.

Prompt deliveries of plain structural shapes were hard to get at the opening of the year, owing to mills being fully engaged and well sold ahead. Prices during the first quarter were well maintained at 1.75 cents, delivered here, for plain shapes. Early in the second quarter producers became more anxious for business and price concessions were made, settling to 1.60 cents in June. In August 1.55 cents, delivered, was quoted and fairly well maintained to the year end. Production was gradually decreased after the second quarter, with mills operating at about 50 per cent. of capacity toward the close of the year. Prices of fabricated material have been generally low, owing to sharp competition for business of that character offered.

Quite an active demand for sheets prevailed early in the year, a good share of the business coming from distant markets, but the demand later became irregular. Eastern makers' prices, which in January were on a 2.70 cents basis for Nos. 18 to 20 gauge, were advanced in February to a 2.80 cents basis, which was maintained until midsummer. Prompt deliveries at times commanded a sharp premium. About August 1 prices receded, but only brought out small lot buying, which a further cut, in September, to a 2.50 cents basis, did not improve. During the last half of the year mills operated irregularly.

A firmness in prices of bars prevailed early in the year, but was not long maintained. Refined iron bars, which were quoted in January at 1.70 cents minimum, delivered in this vicinity, declined in February to 1.60 cents. Efforts to hold prices met with little success, and the decline was gradual throughout the year, fluctuations being irregular, due to conditions of individual mill order books. In June refined iron bars were quoted at 1.50 cents; in September, 1.40 cents. Several months later 1.35 cents, delivered, was quoted, while at the close of the year 1.32½ cents, delivered here, represented about the minimum.

Prices of steel bars showed little variation in prices; at the beginning of the year 1.65 to 1.70 cents, delivered here, was quoted, declining to 1.60 cents in March, when mills began to feel the need of business. This price was maintained until September, when 1.55 cents was named and maintained by leading producers to the year end, although concessions were at times available from independent producers.

Coke

With prospects of a large demand, producers held prices firmly during the early months of the year, but before the first quarter was ended prices had receded. Consumers bought largely in small lots for near future needs, as spot coke could generally be had at a concession over that for forward delivery. During the greater part of the year the market was irregular and, while makers of established brands were well sold up and maintaining quotations, business in the less well-established brands was freely transacted at lower price levels. Some fair sized lots of furnace coke for first half delivery were sold late in the year, but foundry grades were not active. Business at the close of the year was dull. The accompanying table shows the average minimum per net ton for each month for deliveries in this territory:

Average Monthly Prices of Coke, Delivered in Eastern Pennsylvania, in 1910.

	Per Net Ton.			
	Connellsville furnace.	Connellsville foundry.	Mountain furnace.	Mountain foundry.
January	$4.75	$5.25	$4.35	$4.85
February	4.30	5.08	3.90	4.68
March	4.05	4.80	3.65	4.40
April	3.90	4.75	3.50	4.35
May	3.90	4.50	3.50	4.19
June	4.00	4.50	3.60	4.10
July	4.00	4.50	3.60	4.10
August	4.00	4.50	3.60	4.10
September	4.00	4.50	3.60	4.10
October	3.96	4.48	3.56	4.08
November	3.85	4.35	3.48	3.96
December	3.87	4.20	3.50	3.85

Old Material

A downward movement, both in demand and values, occurred throughout the year. Mills entered 1910 well

stocked with old materials and were well bought ahead. Deliveries for a time were freely taken, but were curtailed as the supply became greater than the consumptive needs of the mills. Early in the year a large amount of foreign steel scrap arrived on purchases made during the previous fall. The principal Eastern steel mills participated in the associated buying arrangement until early spring, when one mill withdrew, but later resumed relations with the other interests, and the plan was continued until late in September, when, after an investigation by the Government, the plan was discontinued and the mills again made purchases in the open market.

Heavy melting steel scrap declined steadily in price. In September there was a temporary stiffening and a trifle higher prices prevailed, largely on merchant buying to fill contracts. Prices soon drifted back, however, and were lowest at the close of the year. The other principal grades of steel mill scrap closely followed the general movement in heavy melting steel. Rolling mill grades were irregular throughout the year. Early in July a buying arrangement in which a number of Eastern bar iron mills participated began making purchases through a common buyer, along lines similar to those adopted by the steel mills, but the plan was short lived, being in existence but a few months. Cast scrap followed more closely the movement of the iron market, declining steadily in price. Old stove plate, however, maintained a fairly even range of prices, due to the demand for this grade from consumers outside the immediate district. The year end found the market weak and purchases largely of the bargain lot order. The range of quotations, showing the monthly average minimum price for the leading grades, delivered in buyers' yards in this territory, taking a freight rate ranging from 45 cents to $1.35 per gross ton from Philadelphia, is given in the accompanying table.

Average Prices of Old Material, Delivered in Buyers' Yard in Eastern Pennsylvania, in 1910.
Per Gross Ton.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
No. 1 steel scrap and crops	$17.00	$16.62	$16.50	$16.12	$14.75	$14.45	$14.12	$13.75	$13.85	$13.81	$13.50	$12.65
Low phosphorus	22.94	22.62	22.30	21.37	20.75	20.10	19.25	19.00	19.00	19.00	18.75	18.00
Old iron rails	20.50	20.12	20.30	20.50	20.00	19.80	18.62	18.00	18.00	18.00	18.00	17.20
Old car wheels	17.50	16.81	16.75	16.06	15.12	14.90	14.25	13.94	13.75	13.75	13.50	13.25
No. 1 railroad wrought	19.56	18.94	19.00	18.69	17.50	16.70	16.00	15.37	16.10	16.19	16.00	15.90
Wrought iron pipe	16.62	16.22	16.15	15.37	15.00	15.00	14.12	13.50	13.40	13.00	12.75	12.35
Wrought turnings	14.38	13.50	12.80	11.44	9.94	9.65	9.62	8.81	8.75	8.62	8.50	8.15
Cast borings	12.22	11.50	11.20	10.38	8.94	8.80	9.50	9.31	9.25	9.06	8.50	8.15
Machinery cast	17.00	16.12	16.00	15.87	15.06	15.00	14.94	14.25	14.00	14.00	14.00	14.00
Railroad malleable	16.75	16.31	16.00	15.94	14.75	14.50	14.12	13.75	13.50	13.50	13.50	13.20
Stove plate	13.31	12.87	12.30	11.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00

The Chicago Iron Trade in 1910

BY R. L. ARDREY.

The year began with very bright prospects for the steel industry in this territory. The mills were all oversold, and in the case of bars, structural material and plates they were three to six months behind in deliveries. The casual buyer of steel met with the greatest difficulty in finding a mill that would accept an order for any near delivery. The large producers found it necessary to exercise influence in the direction of preventing further advances in prices, as they foresaw the reaction that would follow a period of high prices.

Features of the Heavy Demand in Early Months

The congestion in the mills was most pronounced in the case of soft steel bars. The agricultural implement manufacturers and other large users of steel bars had bought heavily early in 1909, when prices were low, and the merchant mills were not able to make shipments that would satisfy the demand during the first quarter of 1910. Structural material also commanded premiums for prompt shipment during the first quarter of the year. The plate mills did not get so far behind in deliveries. The wire mills were taxed to their full capacity, but chiefly because there had been heavy speculative buying by jobbers during the preceding six months, when there was a steady advance in wire prices.

In the fall of 1909 rail contracts were taken for 1910 delivery to cover six months' rolling at the new Gary mill and nine months at the South Works of the Illinois Steel Company. During the first quarter of 1910 additional contracts were booked, which practically covered the capacity for 1910 of the South Works on Bessemer rails and the available capacity at Gary. While the Gary rail mill can roll a much larger tonnage, it has only been operated at 40,000 tons per month, as all the finishing departments of the Illinois Steel Company needed billets and about half of the hot metal produced at Gary was apportioned to the billet mill.

During the first half of 1910 there was an actual shortage of crude steel in the Chicago district, and none of the mills here would sell billets. A few old established forging plants obtained their supplies from local steel works, but buyers who relied upon the open market had to depend upon occasional offerings from Eastern mills. An Indiana plant which uses rolling billets, and is located a short distance from Gary, purchased 50,000 tons of rolling billets from a seaboard mill.

Jobbing Interests Greatly Benefited

The large jobbing interests in Chicago reaped a harvest during the first half of the year in large orders from store for mill products in quantities usually sold direct from the mills. Sales of bars from store were unusually heavy, owing to the fact that the mills were so far behind in deliveries. A leading plow manufacturing company at Moline, Ill., had placed its bar contract for the year with the steel mill in Chicago controlled by the harvester interest. Both of these interests found that their requirements for bars were far in excess of their original estimates for their trade year. The plow manufacturer had to purchase 10,000 to 15,000 tons from other mills and from store, and the harvester interest found it necessary to purchase an equally large amount from outside sources to cover its requirements.

The automobile industry was insatiable in its demands for material and parts. Every factory in the country which had equipment and capacity to make automobile parts was levied upon to supply the demand for this voracious young industry. In many cases the automobile manufacturer employed inspectors to watch day and night the factories supplying parts, to obtain prompt shipments. Mills producing certain lines of steel for the automobile trade were six to nine months behind in deliveries. In every line of finished materials the country seemed to have entered upon a period of prosperity which was in remarkable contrast to the two dull years that followed the panic of 1907.

A buying movement in scrap, which began in the

summer of 1909, had carried prices to a high level before the beginning of 1910, and there was a great deal of discussion of the possibilities of a famine in scrap. Figures which were compiled showed that the enormous increase in the capacity of open hearth furnaces could not be supplied with scrap. Foundries had to pay higher prices for ordinary cast scrap than the cost of the pig iron which had been purchased for delivery during the first quarter.

The recession of activity did not reach the finishing departments of the steel mills until the middle of the year, but it began in pig iron about the first of the year. The fundamental cause was restriction of railroad purchases.

The Pig Iron Trade

During September and October of 1909 the foundries and other buyers of pig iron in Chicago territory had covered their requirements for the first quarter of 1910. In November and December the market was quiet and the price receded. The furnace interests generally expected another buying movement in January or February for the second and third quarter, but were disappointed, and prices further receded during the spring and summer. Owing to unfavorable indications in the financial world, along with the general receding tendency in prices, more buyers than ever before adopted the plan of purchasing small lots for near deliveries, instead of making contracts for their requirements six or nine months ahead.

In January and February the principal malleable foundries seemed to feel assured of the future of their business and bought a large tonnage for their requirements for the last half of the year. This movement was accelerated by a reduction in freight rates from southern Ohio furnaces to points west of Chicago. The curtailment of operations in the malleable foundries proved disappointing, especially in the last half of the year, and in some cases the buyers made cash settlements with the furnaces to cancel deliveries of the iron which they had bought.

The average for the year, $17.10 for Northern No. 2 foundry and malleable Bessemer, is the lowest average since 1904. The average for Southern No. 2 foundry for Chicago delivery, $16.30 for the year, is also the lowest average since 1904. In the past 10 years only 1901 and 1904 show lower averages for Northern and Southern iron.

The scrap market has shown a general declining tendency through the year. From July to November heavy melting steel held steady and had a steadying influence on other grades of scrap which are mixed in open hearth charging, but in December this and practically all other grades of material reached the lowest values of the year.

Comparison of Prices

The following tables show the course of prices in the Chicago market, compiled from the weekly reports in *The Iron Age:*

Average Chicago Prices of Pig Iron, 1910.

	Northern coke No. 2.	Lake Superior charcoal.	Southern coke No. 2.
January	$19.00	$19.50	$18.35
February	19.00	19.50	18.35
March	18.38	19.38	17.60
April	17.50	19.00	16.60
May	17.06	18.63	16.23
June	16.75	18.50	15.85
July	16.56	18.50	15.85
August	16.50	18.50	15.35
September	16.38	18.38	15.35
October	16.06	18.12	15.35
November	16.00	18.00	15.35
December	16.00	18.00	15.35
Average for year	$17.10	$18.67	$16.30
Average for 1909	17.49	19.50	17.30
Average for 1908	17.57	20.24	16.76
Average for 1907	24.50	26.56	24.47
Average for 1906	20.43	20.72	19.44
Average for 1905	17.65	17.99	16.66
Average for 1904	14.37	15.50	13.92
Average for 1903	19.25	22.13	18.31
Average for 1902	20.86	23.50	20.10
Average for 1901	15.38	17.50	14.60
Average for 1900	19.47	22.00	18.35

Average Chicago Base Prices of Finished Iron and Steel, 1910.

Month.	Common bar iron. Cents.	Soft steel bars. Cents.	Structural shapes. Cents.
January	1.60	1.68	1.78
February	1.60	1.68	1.78
March	1.55	1.65	1.75
April	1.52	1.63	1.73
May	1.49	1.63	1.68
June	1.46	1.63	1.68
July	1.40	1.63	1.60
August	1.39	1.59	1.58
September	1.37	1.58	1.58
October	1.35	1.58	1.58
November	1.35	1.58	1.58
December	1.35	1.58	1.58
Average for year	1.45	1.62	1.66
Average for 1909	1.43	1.50	1.59
Average for 1908	1.56	1.66	1.82
Average for 1907	1.78	1.77	1.87
Average for 1906	1.71	1.68	1.86
Average for 1905	1.65	1.65	1.78
Average for 1904	1.41	1.50	1.71
Average for 1903	1.65	1.72	1.75
Average for 1902	1.71	1.73	1.75
Average for 1901	1.58	1.58	1.70
Average for 1900	1.75	1.75	2.00

Average Chicago Prices of Old Material, 1910.

Month.	Old iron rails. Gross ton.	No. 1 railroad wrought. Net ton.	Heavy cast scrap. Net ton.	H'vy melting steel scrap. Gross ton.	Old steel rails, rerolling. Gr. ton.
January	$20.00	$14.88	$14.88	$16.00	$18.00
February	19.25	14.69	14.88	15.50	18.00
March	19 00	14.45	14.50	15.00	17.80
April	18.50	14.19	13.69	14.44	17.69
May	17.62	12.87	13.13	13.56	17.12
June	17.00	12.75	13.00	13.15	16.50
July	16.75	12.44	13.00	12.38	15.88
August	16.25	11.94	12.75	12.25	15.31
September	16.00	11.94	12.75	12.25	15.25
October	16.00	11.75	12.50	12.25	15.25
November	16.00	11.94	12.50	12.25	15.06
December	15.70	11.65	12.30	12.10	14.20
Average for year.	$17.34	$12.99	$13.32	$13.43	$16.34
Average for 1909..	18.31	13.76	13.79	14.45	15.82
Average for 1908..	16.60	12.45	12.69	12.45	....
Average for 1907..	22.47	14.63	17.26	15.08	....
Average for 1906..	23.04	15.62	14.55	14.74	....
Average for 1905..	20.18	16.14	13.50	13.97	....
Average for 1904..	16.56	12.45	10.95	10.72	....
Average for 1903..	20.29	16.07	14.75	15.50	....
Average for 1902..	23.91	19.68	15.03	17.37	....
Average for 1901..	19.50	15.00	11.25	....	....
Average for 1900..	17.90	15.00	11.00	....	....

The Outlook

The most encouraging feature in the steel trade at the close of the year is the enormous amount of business pending for the fabricating interests and the mills which supply them. In Chicago the mills recently figured on 70,000 tons of material for bridges and large buildings in this city, and the work in the hands of engineers and architects throughout Western territory, from Chicago to the Pacific Coast, is estimated at 300,000 tons. This represents, to a considerable extent, work which has been held back by the difficulty during the last half of the year in obtaining funds to finance large building projects. The financial situation has become easier and is not expected to retard work in the immediate future.

In Chicago only a few large steel buildings have been erected the past year, but about 20 are now under consideration for the coming year. A new building code was pending for about a year, which would reduce the cost slightly in erecting a steel skyscraper, by making a reduction in the strength required in the columns. This code was finally adopted by the City Council in December. Several of the buildings that had been held back were planned to conform with the provisions of the new code.

The actual production of steel in the Chicago district the past year has exceeded former records of the mills of this territory, owing to the increase in the output at Gary. While the falling off in new business in recent months is disappointing, and has resulted in lower prices, general confidence is expressed in the future. The West has been very prosperous. The corn crop was the largest ever grown, and other crops made a fair average. There have been no upheavals in the labor world to disturb the course of business, and conditions are favorable for a renewal of activity in the iron and steel industry when the railroads resume purchases on a normal basis.

The Cincinnati Iron Trade in 1910

BY CHARLES L. SMITH.

The new year opens with conditions very much different from those existing at the beginning of 1910. Stocks of pig iron are conceded to be nearly double, and prices are from $3 to $3.50 per ton lower than the quotable figures of January a year ago. Consumption has fallen off, though in some lines a fair average has been maintained. For instance, the quarterly report issued December 15 by Secretary Manley of the Cincinnati Branch, National Metal Trades Association, shows that the machine tool builders were working up to 91 per cent. of capacity, taking June, 1907, as standard, which was in the midst of the busiest season ever known in this territory.

Influences Adversely Affecting the Iron Trade

A great deal has been said about the steam railroads delaying the purchase of tools and rolling stock, of which it is known they have been in great need, and which lack of action has undoubtedly had a bad effect on the iron market. But there is another factor that should not be overlooked and which has also affected the market to some extent. During the years of 1905, 1906 and 1907 there was an immense amount of construction work under way for electric railroads. The stock market was flooded with securities of all kinds, for promoting suburban lines, a large percentage of which was built, thus causing a rather unusual demand for rails, cars and other equipment, into whose construction a large amount of metal entered. This naturally helped out the iron market, but when a few of these electric lines proved failures and others did not pay the dividends expected, capital became timid and many projected roads were unable to carry out construction plans. The arrested development in this particular has, without doubt, lessened the consumption of iron enough to have been felt, and the entire blame should not be placed on the steam railroads.

Another matter that might be mentioned is the phenomenal demand from the automobile trade for machine tools and supplies, which was such a feature of 1908 and part of 1909. Naturally this branch of manufacturing had to reach a limit some time, and 1910 has seen the weeding out of a large number of undercapitalized companies that had been good customers for machine tools. As automobile manufacturers are now turning their attention to the commercial truck line, a healthy demand for tools may open up from this source at no distant date.

Apart from the above, overproduction and unwise political agitation are the two causes generally given for present low prices and dull business.

Review of the First Six Months

January opened with an increasing number of inquiries and with a strong feeling that there would be an advance of at least 50 cents per ton before the month was over. It closed with prices the same and with order books fairly well filled for both Northern and Southern iron. Malleable was also a good seller. The month was a decided improvement over January, 1909, and the books of one company showed increased sales of 17,000 tons of Southern iron alone over the corresponding month of the previous year.

February started out all right, but before the middle of the month was reached there was a lull in buying and a softening in prices and the tonnage booked was far below that of January. The month was generally unsatisfactory, but was still ahead of February, 1909. It is notable that local scrap dealers commenced curtailing purchases of scrap, although prices only dropped a trifle.

The first week of March was a period of uncertainty. Southern iron was weak and the trade indifferent. A drop of 50 cents per ton in both Northern and Southern quotations brought out considerable business, and the month wound up very satisfactorily as to volume of business, though the last week showed still further shading in Southern iron prices. In comparison with 1909, one firm reports its sales of Southern iron as exceeding March of that year by over 19,000 tons. Northern producers also experienced about the same ratio of gain. A résumé of the first quarter of 1910 places sales far above the same period of 1909, in spite of the fact that February, 1910, was a very dull month.

There were many rumors of further cuts in Southern prices in the early part of April, and before that month closed the average price had taken another drop, including both Northern and Southern iron. In spite of the rather unstable conditions, sales during April averaged up well, but were far behind those of the corresponding month of 1909. Malleable and basic were especially active. The pipe interests also ordered a larger tonnage than usual. Toward the end of the month bad weather conditions were blamed for a let-up in buying, and May was ushered in with the market very dull. Scrap prices also weakened and there was a reported stagnation in this commodity. A further softening of pig iron prices took place in May, and it was not at all a satisfactory month. One erratic feature is that while the tonnage placed during May was small it was reported as a much better month than May, 1909, while, as stated above, April, 1909, was far ahead of April, 1910.

In June there was considerable competition over a lot of foundry business offered, and there were also some nice sized sales of high silicon iron. Both Northern and Southern foundry prices settled and Southern foundry No. 2 was freely quoted, toward the end of the month at $11.50, Birmingham basis, and Northern foundry No. 2 at $15, Ironton.

Review of the Last Six Months

July started out with a more aggressive feeling, so far as Southern producers were concerned. During the first two weeks some fair sized lots of steel making iron changed hands, and the foundry business also showed up well. The latter part of the month developed a weakness, and Southern foundry went to $11 flat, Birmingham, for spot shipment. Sales in July, 1909, were much heavier than those of July, 1910, and the books of one agency showed an excess of 14,000 tons in favor of the first named month.

In the latter part of August the situation gave signs of clearing up, but almost immediately settled back into the same old rut, and this was another month that was badly beaten out in the matter of tonnage booked in August, 1909.

During September the local foundries experienced a little spurt of activity, but sales were light, and for the last quarter Southern iron settled to $11, Birmingham, although some sellers still adhered to $11.50 for that delivery.

October moved up somewhat in the matter of tonnage booked by local agencies, and there was a decline in Northern foundry to $14, at furnace, which figure was quoted the remainder of the year. With practically all agencies October, 1910, was a much better month than October, 1909.

November opened with a buying movement that surprised some interests, but this did not keep up the entire month. Open offers of $11, Birmingham, for Southern foundry, and $14, Ironton, for Northern, deliveries to run through the first quarter of 1911, were freely made, and some furnaces were said to be willing to take business for the first half at the same figures. Sales during November footed up better than for the same month of 1909.

December, always a dull month, was exceptionally so, and during the latter part very little business was taken. Prices remained the same, although there were reports

that some furnaces were willing to take on spot business at a few cents below the market quotations.

Range of Prices

Below are given the average prices per month on both Northern and Southern iron, delivered f.o.b. cars Cincinnati, and in the same table are included Cincinnati quotations on different grades of scrap material:

	Southern No. 2.	Northern No. 2.	No. 1 railroad wrought. Net ton.	No. 1 cast scrap. Net ton.	Heavy melting steel. Gr. ton.
January	$17.25	$18.20	$15.56	$13.87	$15.37
February	17.06	18.20	14.12	12.75	14.44
March	16.12	17.57	13.50	12.50	14.00
April	15.37	17.01	12.87	12.50	13.56
May	15.00	16.45	12.37	12.12	12.12
June	14.85	16.20	11.40	11.10	11.40
July	14.75	16.20	11.50	11.12	11.50
August	14.31	15.70	12.25	11.50	12.00
September	14.25	15.70	12.50	11.50	12.00
October	14.25	15.32	12.50	11.50	12.00
November	14.25	15.20	12.50	11.50	12.00
December	14.25	15.20	12.50	11.50	12.00

During the latter part of 1910 old material dealers made an attempt to hold prices on scrap somewhat firmer, as practically all of them have large stocks on hand. Few sales were made, as most consumers could afford to use pig iron at present market prices.

Through the courtesy of a local firm we are enabled to give herewith the average price each month at which its Southern pig iron was billed out. In other words, these figures represent the average invoice price, and have no bearing on the sales price, but represent the average on shipments moved, covering all grades of Southern iron only:

January	$13.76	July	$12.68
February	13.55	August	12.06
March	13.40	September	11.97
April	12.70	October	11.64
May	12.67	November	11.70
June	12.50		

In conclusion, it may be said that there is a general belief that the early spring will see considerable improvement in the situation. Business men are getting over their fears of radical legislation from Washington, as it is generally recognized that lawmakers are becoming more conservative and not so ready to fight corporate interests without due investigation as to their methods of conducting business.

The Copper Trade in 1910

BY L. M. ATHERTON.*

The year 1910 will go down in history as one of disappointment to the copper producing interests. Following the unsatisfactory conditions prevailing in the trade during 1909, the opening of 1910 was looked forward to with the hope that better things were coming. General business had shown satisfactory recovery from the 1907 panic, copper being practically the only industry which seemed to be unable to get on its feet. Indeed, in January, with a refinery output of 116,000,000 lb. of copper and domestic and expert deliveries aggregating the enormous total of 160,000,000 lb. the United States surplus decreased over 43,000,000 lb., the price of the metal touched 14 cents and producers took fresh courage. The turn in the tide was only temporary, however, and for the next five months the metal piled up until the world's surplus of copper reached the alarming total of 401,000,000 lb.

Broke Production Records When the Market Was Glutted

Here was presented the spectacle of the two largest producing interests in the country apparently striving to break all production records at a time when the market was glutted with copper. The price of the metal touched 12⅛ cents, and consumers stood aloof and bought from hand to mouth. Arrayed on one side of the fight were the Amalgamated-Cole-Ryan interests, and on the other side Guggenheims, with their American Smelting & Refining and Utah Copper Company affiliations. This was the battle of giants, either side attacking the other whenever opportunity offered, and at the same time pursuing diametrically opposite tactics in regard to sales of the metal.

The Guggenheims, fortified with the rapidly increasing output of the porphyry mines—Utah and Nevada consolidated—dumped their copper on the market as fast as it could be refined, larger sales being made as low as 12½ cents. On the other hand, the United Metals Selling Company accumulated the metal, and at one time was carrying over 100,000,000 lb. The reasoning that dictated this policy was that consumption was rapidly approaching volume of production and ought to exceed it when the United Company would hold the only large available supply of spot copper.

Evidently the warring factions came to the conclusion that a continuation of the then existing policy was suicidal. At any rate, in the latter part of July their representatives met in London—quite by chance—reason supplanted personal feeling and curtailment was inaugurated.

Curtailment of Production Put in Force

The curtailment was intended to amount to about 15 per cent., but has been about 10 per cent., or about 13,000,000 lb. per month. Since the programme was adopted, therefore, there has probably been withheld from the market the equivalent of 75,000,000 lb. of refined copper. Even with this restriction the output of United States refineries for 1910 will reach a new total at very close to 1,448,000,000 lb. Thanks, however, to a new high record of deliveries both for domestic and foreign consumption the American surplus for the year ought to show a decrease of at least 22,000,000 lb., as will be seen from the following tabulation, partly estimated:

Movement of Copper in 1910, in Pounds.

Stocks, January 1, 1910	141,766,111
Production	1,448,000,000
Domestic deliveries	768,000,000
Exports	702,000,000
Total deliveries	1,470,000,000
Excess deliveries	22,000,000
Stocks, January 1, 1911	119,766,111

An encouraging feature of the statistical position of the metal at present is the practically uninterrupted decrease in the foreign visible supply. In March the foreign accumulation reached the total of 254,000,000 lb., but in the face of continued large shipments from this country is now down to approximately 187,000,000 lb. This decrease in foreign stocks has, of course, assisted materially in keeping the world's visible supply at an equilibrium. For the year the world's visible will have been decreased about 79,000,000 lb., as per the following table, a portion of the figures being estimated as before:

The World's Stocks of Copper, in Pounds.

	United States.	Foreign.	Total.
Stocks January 1, 1910	141,766,111	244,205,800	385,971,911
Stocks July 1, 1910	168,276,017	232,863,680	401,139,697
Stocks January 1, 1911	119,766,111	187,000,000	306,766,111
Decrease for year	22,000,000	57,205,800	79,205,800

The natural result of the above noted improvement in the statistical position of the metal should have been a stronger tone in its price. This has been true to a certain extent, although the rebound in price has been less

* Of the Boston *News Bureau*.

than was the decline when the surplus was accumulating. For example, the average price for electrolytic declined from 13.62 cents in January to 12.215 cents in July, or nearly 1½ cents; while in no month since July has the average touched 13 cents, and the tendency at the moment is downward rather than up. The average for the year will be not far from 12¾ cents, comparing with 13 cents in 1909.

The Porphyry Producers

One very striking development must be recorded in any review of the copper industry for 1910, and that is the prominent position to which the porphyry producers have attained. For a long period the vein miners were disposed to discredit the assertions as to output and costs claimed by the porphyry mines, and in fact the treatment of low grade ores at anything like a cost of 8 cents per pound for the copper contents was ridiculed. The fact remains, however, that two of the most notable porphyries, Utah Copper and Nevada Consolidated, have, during the past year, in spite of a voluntary restriction during the latter months, made a combined output of 154,000,000 lb. of copper. The total cost of this copper was probably not over 8 cents per pound according to the methods employed by the porphyry bookkeepers. There has been some criticism that the porphyry miners were not including in their operating account sufficient sums to represent the depreciation of equipment, the charges for stripping surface waste and, what is still more important, the exhaustion of the mine itself.

Some of the most able engineers in the copper mining industry, however, are identified with the porphyry properties, and the record which has been made by the larger mines of this description constitutes a most remarkable achievement. During the next year Miami, Ray Consolidated and Chino will be added to the list of porphyry producers, but, including these three properties, together with an estimated increase of 20,000,000 lb. from the Utah Copper, it is improbable that exceeding 65,000,000 lb. of new product will issue from the Eastern refineries in marketable shape, so that in reality there is nothing very apprehensive to be feared from the new producers during the next 12 months.

Looking to the other side of the account, however, there is to be considered the disastrous showing of some of the vein mines during the year. The two most recent examples are Granby and Utah Consolidated which produced 6,000,000 lb. less in 1910 than in 1909. It is problematical whether Utah Consolidated will ever again produce 7,000,000 lb. in a year. The rejuvenation of Granby, although well in progress, is bound to be slow. North Butte and Calumet & Arizona, two other disappointments in the vein mines, are also being energetically developed, but may not soon be expected to attain high mark productions.

During the year much has been done in the way of consolidations, notably the bringing of the Amalgamated-Anaconda properties under the dominion of the latter, the acquisition of the Clark properties in Butte by the Amalgamated, the acquisition of a controlling interest in Nevada Consolidated by Utah Copper, and the merger of Calumet & Arizona and Superior & Pittsburgh.

The Outlook

The outlook for the coming year is one of great uncertainty. Everything depends upon the general state of business. The maintenance of present unsatisfactory business conditions means a considerable shrinkage in copper meltings during the next 12 months, and the prevailing market prices can only be sustained through a still further curtailment of output unless orders for the metal come in faster than they are now doing. Efforts are being made, however, to bring the largest interests in the copper industry, who have been heretofore antagonistic, into some sort of harmonious co-operation with respect to production and sales. Several "copper dinners" have recently brought together warring interests heretofore bitterly competitive, and there is thought to be on foot some scheme whereby selling may be centralized in the hands of one strong agency in which all the participating companies may have a financial interest based upon the output contributed.

No sound economic criticism can be advanced against the wisdom of conserving our copper resources. They are not inexhaustible, and the 10 to 15 per cent. curtailment programme which has been tacitly agreed to by several of the important factors in the trade, if honestly lived up to, should do much toward keeping from the market a burdensome surplus as well as preventing the needless exhaustion of ore reserves at a time when the selling price is much nearer the cost of production than has been the case for many years.

The Sheet and Tin Plate Trades in 1910

BY B. E. V. LUTY, PITTSBURGH.

Another memorable year has passed in the sheet and tin plate trades. Not only have former production records been broken; they have been broken badly. A year ago it was with some diffidence that this review asserted that all records for sheet production were broken in 1909 by a comfortable margin, for the feeling in the producing trade at that time was evidently not that any new tonnage record had been made. With more confidence it can now be asserted that the records of 1909 have been exceeded in 1910 by a large margin. We append our estimates for 1910 to the statistics available:

Sheet and Black Plate Production.—Gross Tons.

	Sheets, 13 and lighter.	Black plates for tinning.	Total.
1905	983,437	507,587	1,491,024
1906	1,074,525	576,079	1,650,604
1907	1,084,700	504,072	1,588,772
1908	864,901	513,771	1,378,672
1909	1,248,404	606,844	1,855,248
1910	1,400,000	700,000	2,100,000

Our estimate of sheet production in 1910 is only intended as a rough approximation; the estimate of black plate production claims more accuracy. In the case of black plates the official statistics are likely to fall nearer to 725,000 than 700,000 tons. Our estimate of a year ago for tin and terne plate in 1909 was 600,000 gross tons, with the qualification: "This is a round figure, and we should expect the official statistics to exceed rather than fall short of it." The official statistics showed 612,951 gross tons of tin and terne plate in 1909.

Prior to 1905 there were no statistics of sheet production, except for a few years in the nineties. Statistics of tin plate production have been available, through one channel or another, since the establishment of the industry. We give the figures in gross tons for selected years, appending our estimate of 1910, which is not made larger than the forecast for black plates for tinning for the reason that it is assumed a larger tonnage of black plate stock is being carried now than a year ago:

Tin and Terne Plate Production.—Gross Tons.

1891	999	1907	514,775
1895	113,666	1908	537,087
1900	302,665	1909	612,951
1905	493,500	1910	700,000
1906	577,562		

There is every prospect that, given anything like

normal conditions in 1911, the output of both sheets and tin plates will exceed that of 1910.

The Number of Mills

In the past two years there has been much new erection in both the sheet and tin plate branches. Following the custom established in this report a year ago, a mill is called a sheet mill unless it really produces black plates for tinning. Thus a "tin" mill may be a sheet mill, while a mill making black plates for tinning is a tin mill. The fact is that in mill parlance the fundamental distinction between a sheet mill and a tin mill is the wage scale paid, not the character of the equipment. There is the sheet mill scale and the tin mill scale, and the way to change a sheet mill to a tin mill is to notify the men that the tin mill scale is going to be paid. The difference is simply that the tin mill scale involves lower rates per ton than the sheet mill scale, but does not allow the rolling of material over a certain size without an extra. For the purposes of this review, the only tin plate mills are in those plants which have tin houses attached. Others are sheet mills, although they may make tin mill sizes of black material.

At the beginning of 1909 there were in regular operative condition about 184 sheet mills. During the year there was a net addition of about 23 mills, making about 207 at the beginning of 1910. During 1910 the following new sheet mills were completed, all being additions to existing sheet mill plants, except the Phillips addition, which is an addition to a tin plate plant at Weir City, W. Va., and the Canton Sheet Steel Company, which has an entirely new plant, practically completed at the close of 1910:

New Sheet Mills Completed in 1910.

Canton Sheet Steel Company	8
Inland Steel Company	8
Massillon Rolling Mill Company	4
National Sheet Steel Company	1
Phillips Sheet & Tin Plate Company	8
Stark Rolling Mill Company	1
Thomas Steel Company	5
West Penn Steel Company	3
Youngstown Sheet & Tube Company	8
Total	46

The National Enameling & Stamping Company increased its tinning operations at Granite City during the year, justifying the transfer of five mills from the sheet to the tin plate classification. The Granite City plant is now classified as operating 15 tin plate mills, tinning the product, and nine sheet mills (of which four are regular sheet mills and five the so-called "tin" mills), while the St. Louis plant of the company contains six sheet mills. Deducting the five mills from the 38 listed above makes a net increase of 41 mills, which, added to the 207 at the beginning of 1910, makes a total of 248 sheet mills at the close of 1910.

Several plants, long inoperative, are not included in this total of 240 mills, which involves only mills which ran for a considerable part of 1910 and mills just completed.

Among sheet mills being built are 10 by the American Rolling Mill Company and two by the Follansbee Bros. Company.

New Tin Plate Mills

At the beginning of 1909 there were about 87 regular tin plate mills in the country, in regular operative condition, and actually tinning their product. Net additions in 1909 amounted to about nine, making 96 at the beginning of 1910. During the year there were completed:

New Tin Plate Mills Completed in 1910.

Carnahan Tin Plate & Sheet Company	1
Jones & Laughlin Steel Company	12
McKeesport Tin Plate Company	10
Phillips Sheet & Tin Plate Company	12
Wilkes Rolling Mill Company	1
Total	36

Counting the five mills deducted from the sheet mill list on account of increased tinning operations at Granite City, and deducting the three-mill Alcania plant, which closed in the spring for an indefinite period, the net addition in 1910 was 38 mills, making 134 regular tin plate mills, in operative condition, at the close of 1910. Besides this there is an idle plant at Greencastle, Ind., and a plant at Marietta, which is classed as a sheet plant. It made a small tonnage of tin plate in 1910, but the interest now operating it does not contemplate conducting tinning operations.

The McKeesport Tin Plate Company is adding two mills, which are nearly completed.

The Leading Interest

The American Sheet & Tin Plate Company has made no important changes in its mills in the past two years. It has 184 sheet and jobbing mills, besides two light plate mills. On its tin mill list it has 235 mills, the seven-mill Anderson plant having been abandoned some time ago. In the 235 mills, however, are included the seven-mill Cambridge plant, which has no tinhouse, and the 11-mill United States plant, which conducts galvanizing besides tinning operations.

In July the American Sheet & Tin Plate Company awarded contracts for 16 sheet and four jobbing mills, to be erected at Gary, Ind., and at another time contracts for two 72-in. plate mills to be a part of the Gary unit.

The Market in 1910

The demand in 1910 for both sheets and tin plates was eminently satisfactory from a tonnage standpoint, as compared with previous years, for there was a large gain in the requirements. There was, however, also a large gain in the productive capacity, and this made it difficult for all the sheet mills to fill up. While the new erection has been rather large in the past two years, the increase in capacity is materially greater than is indicated by the number of mills added, for the output per mill has undergone a large increase in the past few years. Sheet and tin mills used to be operated in rather timid fashion, but the size of the rolls, the strength of the housings and the engine power have been greatly increased, and the most successful mills are those which are pushed hard.

The year opened with No. 28 black sheets at 2.40 cents and No. 28 galvanized at 3.50 cents, closing with black sheets at 2.20 cents and galvanized at 3.20 cents. The decline was rather irregular, and the lowest prices, which prevailed more or less continuously from August to November, were a dollar or two a ton below the closing prices. Corrugated roofing opened the year at $1.70 per square for painted and $3 for galvanized, closing prices being $1.55 and $2.75, respectively.

The prices of 2.40 cents and 3.50 cents, showing a spread of $1.10 per 100 lb. between black and galvanized sheets, were made by the advance of November 12, 1909, previous prices having been 2.30 cents and 3.35 cents, so that the spread was increased by 5 cents per 100 lb. The average price of spelter at East St. Louis in November, 1909, was 6.25 cents. Late in November, 1910, when the spread between black and galvanized sheets was hardly more than $1, spelter reached its high point after the decline of early in the year, touching 5.90 cents for a few days. The pinch upon the galvanized sheet branch was then severe.

The tin plate market made a record for itself in 1910, as there was no deviation from the price of $3.60, which had been established by the 10-cent advance of November 12, 1910. No other important steel product, with the sole exception of standard sections of steel rails, made such a record in 1910, as all other products declined.

There was a total decline of about $4 a ton in sheet bars during the year. The margin between sheet bars and sheets was close at the opening of the year and as the declines were about on a parity there was a small margin to the sheet manufacturers all year. The tin plate mills fared much better, as there was no decline in their finished product, and the only set-off to the decline in sheet bars was the advance in pig tin. This averaged a trifle over 38 cents in New York in December, or about 5 cents higher than in December, 1909, adding in round figures 10 cents a box to the cost of making tin plate, while the decline in sheet bars deducted about 20 cents. On the whole 1909 and 1910 were both good years for the tin plate manufacturers, accustomed as they have become to very small margins.

Recent Tendencies in the Foundry Industry

Machinery Has Done Much and Must Be Utilized Increasingly—The Future of the Molder

BY DR. R. MOLDENKE.*

One of the pleasant reminiscences of the Detroit convention of the American Foundrymen's Association, held in June, 1910, was a visit with a kindly old gentleman from a prairie city of the extreme Middle West. Himself the owner of a progressive foundry, and father and grandfather of foundrymen, his comparison of conditions as he had left them when going West in his youthful days, with the magnificent display of progress in the exhibition, was truly inspiring.

The writer has helped many a foreign visitor to access to our best establishments, and in discussing European and American practice with them on their return, as contrasting former methods with present accomplishments, has invariably had confirmed his own impression that no single advance stands out so clearly in shop improvement as the development of the molding machine. In a more general way, side by side with this advance, stands the spread of information on the metallurgy of cast iron which is making our great specialty foundries so potent a factor in the conservation of national resources in their particular direction. Two things which our broad minded men of affairs would like to see realized—and modern tendencies in the foundry industry are working that way—are the payment of a premium for brains in the works and the elimination of that killing labor which is the bane of the molder's existence.

Machinery Must More and More Be Used

The molding machine is not developed sufficiently to fit with these two desiderata. Subsidiary apparatus must be added and a higher grade of men employed to bring about ideal conditions. To get right at the root of the matter, just step into any ordinary foundry which has an equipment of molding machines, and note the heavy labor the man in charge of the machines has still to perform. The handling of the sand, the tucking in that may be necessary, the lifting of the molds—all mean the continued bending of the back and exerting the muscles of that region to an extent which leaves exhausted men at quitting time. All this should be accomplished by machinery, and the molder should only look after the fine points of adjustment and finish, and thus bring the proprietor the full return for his invested capital. It is high time that the myth of a molder having to pour his own work be done away with, for from personal observation and experience, a specially trained pouring gang can do far better. Nevertheless, men cannot be blamed for wishing to shorten the molding hours somewhat by doing their pouring and shaking out to some extent, so long as molding operations are so severe physically.

A still worse feature is the lot of the laborer attached to the molding machine outfit. Who has not seen this individual carry the prolific output of a good machine with an easy pattern pretty nearly over a quarter of an acre of ground? With heavy molds this is man-killing, and the molding machine fraternity should bend its energies in the direction of means, pneumatic or otherwise, to handle the molds as fast as completed—whether by sliding along or conveying—without lifting them in any way until they are dumped. It is then only that the proprietor can properly inforce the maximum capacity of the installation. As it is at present, results are only obtained at the cost attending a change in perhaps 150 per cent. per annum of the operatives about a busy molding machine plant.

The Advance of the Jarring Machine

The development of the molding machine along the lines of the jarring machine, with the big castings that can now be made with this, is a hopeful sign, for it will go a great way toward solving the problem of the molder. With sand conveying and facilities for handling the molds rapidly the tonnage of a foundry can be greatly increased. That this is the modern tendency is shown by some of our large works in which the above mentioned objection to laborers carrying molds long distances is partly overcome by dumping close to the machine, through gratings in the floor, the sand being retempered in the cellar. Naturally continuous pouring is essential to such a plan.

Even in the smaller establishments, notably jobbing shops with some special line of machinery castings as part of the daily output, the jarring machine is being installed, and large castings thus cared for rapidly and with comparatively few men. Space is economized and the specially good men can be put at other molding work.

There is a tendency toward conveying machinery in the foundry as never before. Shops are beginning to equip themselves in this direction, to be independent of fluctuations in the labor market as well as to get good returns on the investment. One great foundry has practically everything run by conveyors and the results are reported excellent.

Continuous and Intermitted Pouring

The great advantage of molding machinery as adapted to large work has really not yet been much touched upon. With molds closed up much faster than formerly, good ventilating systems, sand handling and tempering machinery, it becomes an easy matter to so adapt continuous pouring in the jobbing shop that molding proper may continue all day long. Only those who know the capabilities of the ordinary cupola for intermittent melting can see this readily; but it is actually an easy matter to begin pouring at 7 a.m. and, stopping for a few hours at a time all day long, to have molten iron available almost on tap for each big mold as completed. Wind off, draining out, draft shut off, and what can happen to the cupola until the wind is put on again when iron is wanted? Proper charging and attention to conditions so that gases do not get into the pipes and blower which may ignite explosively is all that is required. With a good pouring gang, molding should go on all the time and foundry skilled labor remains in the greatest measure productive.

That the advantages of continuous pouring are appreciated is attested by the great number of foundries looking into the question at the present time. Progress is, however, essentially slow, as continuous pouring is complicated by questions of smoke, hot sand and the like, which must be taken into account at the same time. However, as our foundries are growing in tonnage, one by one they are extending their pouring time, it being a common occurrence already to have the blast go on after dinner. Necessarily molding must continue until quitting time, with extra help for pouring, otherwise the shop cost would become excessive if run along the old lines of work.

The Permanent Mold

Finally, the question of the iron mold is becoming an acute one. The advantages are so manifest where duplication work is the rule that there is little wonder in regard to the many inquiries that are constantly made. Gradually foundrymen are learning to appreciate the principles underlying the exchange of metal for sand as the container for molten iron, and the future will see the introduction of this new method of casting developed quite rapidly.

* Secretary American Foundrymen's Association.

The Foundry Labor Problem

There is a feeling of unrest pervading the industry in regard to the skilled molder. Unquestionably there are not enough of them to go around, and too few new ones are being trained. Attention is therefore being given to the materials used in the foundry more than heretofore has been the case. Competition is gradually cutting down profits in given lines and hence economy must be practiced in every direction. There is a study of the tonnage that can be produced with a given molding sand as compared with other varieties; also of facings and blackings to help cut down discounts and enhance the selling quality of castings. And finally, melting methods are being looked after in foundry after foundry in order to remove any uncertainties—fortunately not altogether so much to cheapen as to get full value for the expenditure incurred.

What has been written above is reflected in the correspondence of the writer with foundrymen all over the civilized world, as well as seen by him in frequent travels about this and other countries. Perhaps, also, the secretaryship of the American Foundrymen's Association offers unique opportunities for observation. At any rate, what follows may be taken as having been observed by the writer and many others. Passing through shop after shop, and often remaining some time professionally to assist in overcoming troubles, one is struck with the unencouraging aspect of the employees as a whole. The young men seem to hurry through their work to get at the evening's enjoyment, and the older ones dream of pay day while they pound sand. In many shops, on being asked to compare notes with the foremen in regard to possibilities for advancement of men to assistant foremanships, not a single man could be picked out that seemed to care. In such shops they look for foremen outside and this only accentuates the trouble.

We all know of shops the young men of which are snapped up as fast as they care to leave. This while creditable to the concerns on the alert for good workmen is not a fair deal in a way, as the burden of training youth for the foundry should be equitably distributed. However, it emphasizes a tendency which has developed into foremen's associations for educational work only, an effort wisely encouraged in some of our industrial cities by the fullest co-operation of foundry employers.

In general it may be said that at no period of the foundry industry have we faced better defined tendencies for advancement than now, and this may be credited to a higher equipment along technical educational lines on the part of the present generation of foundrymen than was ever the case before.

Customs Decisions

Ignition Cable

The Board of United States General Appraisers has handed down a ruling affecting the classification of ignition cable, composed of rubber and wire. The importation in question was made by the Packard Motor Car Company. Duty was assessed at the rate of 40 per cent., under the provisions of paragraph 135 of the tariff act of 1909, which specifies "telegraph, telephone, and other wires and cables composed of metal and rubber, or of metal, rubber, or other materials." The importer set up the contention that the merchandise is in chief value of India rubber and therefore dutiable at only 35 per cent., under paragraphs 463 or 464. General Appraiser Fischer, who writes the decision, says it is clear to the customs tribunal that the wire or cable here in question, composed of metal and rubber, falls directly within the express terms of the above cited provision. The assessment is affirmed and the protest overruled.

Plumbago Crucibles

The Transcontinental Freight Company has been unsuccessful before the board in an effort to reduce the duty on merchandise invoiced as plumbago melting crucibles. It was assessed for duty as articles composed of earthy or mineral substances under the appropriate provision in the tariff act of 1909. It is claimed in the protest that the merchandise is entitled to free entry as plumbago under paragraph 654. Judge Hay states in his decision for the board that the protest was submitted without testimony and that there is nothing before the board to justify a disturbance of the collector's action, which he says is presumptively correct. The protest is therefore overruled.

Chain Information

Bradlee & Co., Empire Chain Works, 726 Richmond street, Philadelphia, Pa., have issued a pamphlet entitled "The Care and Use of Chain." Two important tables are presented. One of these gives the pitch, weight per foot, outside width and breaking proof and working strains of chain running from ¼ to 3-16 in.; the other gives dimensions of chain links running from 3-16 to 3 in., covering the outside length and outside width. Directions are given how to find from these tables the weight a chain will lift when rove as a tackle; to find the size of chain necessary to lift a given weight, and to find the outside length of any number of links. The following are a few extracts from the pamphlet which will be found of interest by users of chains:

The life of a chain can be greatly increased by frequent annealing and lubricating, and when the wearing is not uniform throughout the length the chain should be cut and pieced where partially worn, so that when finally discarded every link shall have done its full share of work, without overstepping the limit of perfect safety. Hoisting and sling chains should be annealed once a year at least, and carefully examined before being taken into use again. The chain of hydraulic machinery should be oiled with a brush, once a week or oftener if the machines are worked much, and, to effect this, they should be slacked in order to get the oil well between the links. The strength of a chain is the most essential matter connected with it, and the best is none too good. For this reason great care and watchfulness must be bestowed in the endeavor to obtain good material, good welds and, what is so essential, properly formed links, and few buyers understand what cost is thus entailed.

The diameter of sheaves or drums should not be less than 30 times the diameter of chain iron used.

Hooks and rings should be made from the best hammered iron and will appear clumsy and out of proportion to the size of chain, when made to equal its strength; for instance, a hook for ¾-in. chain should be made from 2¼-in. iron and weigh 20 lb., and the ring, if less than 6 in. in diameter, should be made from double the size of iron in the chain, and if greater in diameter the size of iron must exceed this proportion. We would recommend in the construction of hooks, where it is possible, that the shank be made long in order to avoid acute angles, and to facilitate the handling of the hook without risk of injury to the hand of workman. Chains for hoisting purposes should be made of short links in order to wrap snugly around drums without risk of bending, and have oval sides, so that when the chain surges each link will act as a spring, yielding a trifle.

Among the papers to be read at the annual convention of the Indiana Engineering Society, to be held at the Denison Hotel, Indianapolis, January 12, 13 and 14, will be: "Individual Electrical Drives Applied to Textile Mills," C. A. Tripp, Indianapolis; "A 40-Foot Reinforced Concrete Girder," F. A. Kattman, Brazil; "The Use of Upsets and Loop-Eyes on Steel Rods in Bridges," Malverd A. Howe, Rose Polytechnic Institute, Terre Haute; "The New McKinley Bridge Over the Mississippi River," J. D. Knapp, Venice, Ill.; "The Manufacture of Cement," C. W. Boynton, Chicago.

The two-story and basement addition, 70 x 110 ft., which is being built at the plant of the Field Force Pump Company, Elmira Heights, N. Y., is practically completed, and new machinery is being installed.

Ornamental Castings Made in Permanent Molds

Details of the Practice Developed at the Dow Wire & Iron Works—The Mixture, the Molds and the Economies of Production

BY R. HASTINGS PROBERT.*

The production of high-class work in permanent iron molds in connection with the continuous melting process is a commercial success. In the past three years the writer has been investigating permanent cast iron molds for high-class gray iron castings, and the results obtained are entirely successful.

Ornamental Castings

At the plant of the Dow Wire & Iron Works, Louisville, Ky., ornamental gray iron castings are now made in permanent molds, and the character of the product is shown in Figs. 1 and 2. The first experiments were made in casting ornaments, such as are fitted on wrought iron bars, as shown in Fig. 3. These ornamental parts are separators, buttons, balls, spear points, pickets, corner pieces, borders, molding, panel pieces which are used in the manufacture of structural work, building materials and ornamental iron work. The casting of these ornaments directly on the particular bar or member to which they belong is a large saving in the shop cost. There are many contracts for which the ornaments can be so constructed instead of separately casting them in green sand, or turning them in the lathe out of a solid bar, with the additional work of filing, fitting, drilling and tapping, or pinning them separately on to their individual members, which is a longer and much more costly process. The possible cracking open of these castings when shrinking, in cooling on the wrought bars, owing to the different natures of the two metals, the unequal thicknesses of the castings and their rapid cooling around the bars, has been successfully overcome, and ways have been found of making the castings tough, durable, strong and soft enough to machine.

Fig. 1.—Ornamental Gray Iron Castings Made in Permanent Molds.

Fig. 2.—Cored Castings as Made in Permanent Molds.

Separate Castings Cored

Ornaments are also being cast separately and cored out the exact sizes to fit the members or bars they are intended for. They leave the mold perfectly clean and are easily drilled and tapped for fastening them into place. The cores are made from soft steel bars or rods for the small castings, and cast iron cores are used for the larger castings. In Fig. 2 the ornaments *a*, *b* and *c* are cored with wrought cores, and the ornaments *d* and *e* are cored with cast iron cores. The castings *f*, as shown in Fig. 2, are parts of grinding machines, for grinding corn, coffee, spices, &c. These for years have been generally known as "chilled burrs for grinding" and have been made more hard than tough—really too hard, and not tough enough to prevent their chipping and spawling off when in use in grinding. They are successfully made in iron molds, with the teeth in their grinding surfaces clear, sharp, tough and strong, their hardness is sufficient to prevent wear in reasonable time, as the quality of these or any other castings can be regulated to any degree of hardness or toughness required when casting them in iron molds.

Ornamental Balusters

In Fig. 3, *g*, *h*, *i* and *j*, are cast iron fluted balusters of Greek resign, made in a permanent mold for the main

* Superintendent Dow Wire & Iron Works, Louisville, Ky.

stairway in a new office building for the Louisville Water Works Company. There were only 250 balusters to make for this special job, so the price of the mold had to be considered, as in all probability it would not be needed a second time. To build the mold large to overcome possible hard castings, meant considerable expense for so small a number of castings. So it was designed and made to weigh 294 lb. The ratio of weight of mold to castings was 21 to 1, as the balusters average 14 lb. each. The mold was made in four parts. The sides were hinged to the bottom, with the top movable, and the whole mounted on a temporary frame trunnioned on stanchions set into the foundry floor.

Owing to the different angles or pitch in the sections of railing, the balusters varied in length from 2 ft. 2½ in. to 2 ft. 8 in. Notwithstanding this difference in length they were all cast in the one mold, this being made long enough to provide for adjusting the detachable rake pieces *k*, *l*, *m*, *n*, *o*, *p*, Fig. 4, to the required length of the balusters, after ascertaining the exact amount of the shrinkage. At *s* is the slotted gauge used for holding the rake piece in place in the mold.

Gates and Vents

A few of the first balusters were poured on end, but this was not a success; the castings did not fill out in the rakes, and the fluted body was seamed or segregated. The mold was then placed horizontally on its frame with vents and gates as shown at *t* and *v*, Fig. 4. The gates were made large, being bell-mouthed on top so as to give a fair sized riser. From the first this was successful. The sharp edges of the rakes were doubtful at first, but it was found that the expansion of molten metal crowded the metal up into the extremely sharp knife edges of the rake, as shown at *g*, *h*, *i*, *j*, Fig. 3.

The metal was poured as hot as possible. Two hand ladles were used, pouring the mold at both ends at the same time.

Overcoming Hardness

As the balusters had to be drilled and tapped at the ends for the connecting screws to the hard railing (Fig. 5) they had to be soft enough to machine. This was accomplished by making a soaking pit in the foundry floor close to the molding frame. The pit was made about 2 ft. 6 in. deep, 3 ft. wide and 4 ft. long. It was lined with one thickness of fire brick and fitted with a No. 12 gauge sheet iron cover. When the balusters were poured they were quickly taken out of the mold at a bright cherry-red heat and laid flat, one upon the other, in the soaking pit. No fuel was used; all the heat required was supplied by the hot balusters themselves, excepting a small sprinkling of powdered charcoal between the layers. The entire mass was allowed to cool down together and when taken out the product was found to be tough, easily machined and filed, with no scale and as clean as when the pieces left the mold. The molding frame and pit being close together permitted the man operating the mold to place the balusters in the pit without any additional help. The cost of the soaking pit was quite small, and the results obtained were excellent. The castings were not twisted or warped in the least.

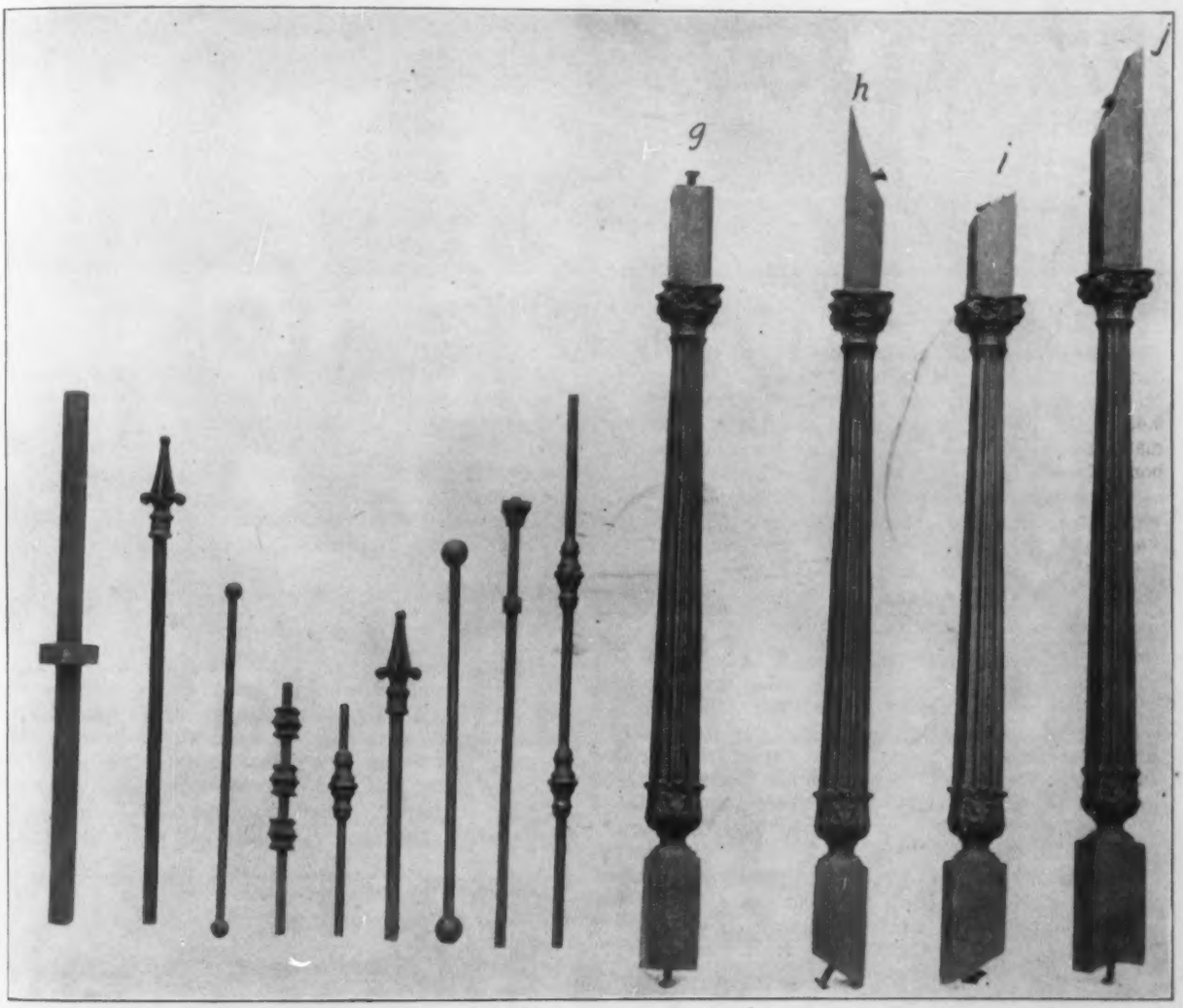


Fig. 3.—(At the Left) Ornaments Cast on Wrought Iron Bars.—(At the Right) Cast Iron Fluted Balusters.

Character of the Mixture

The cupola charges were as follows:

250 lb. Rockford pig iron.
150 lb. heavy machinery scrap.
100 lb. No. 2 foundry pig.

500 lb. Total.

Rockford pig is fluid, soft and carries scrap. It runs 2.25 to 2.75 per cent. silicon, .015 to .03 sulphur, 1.40

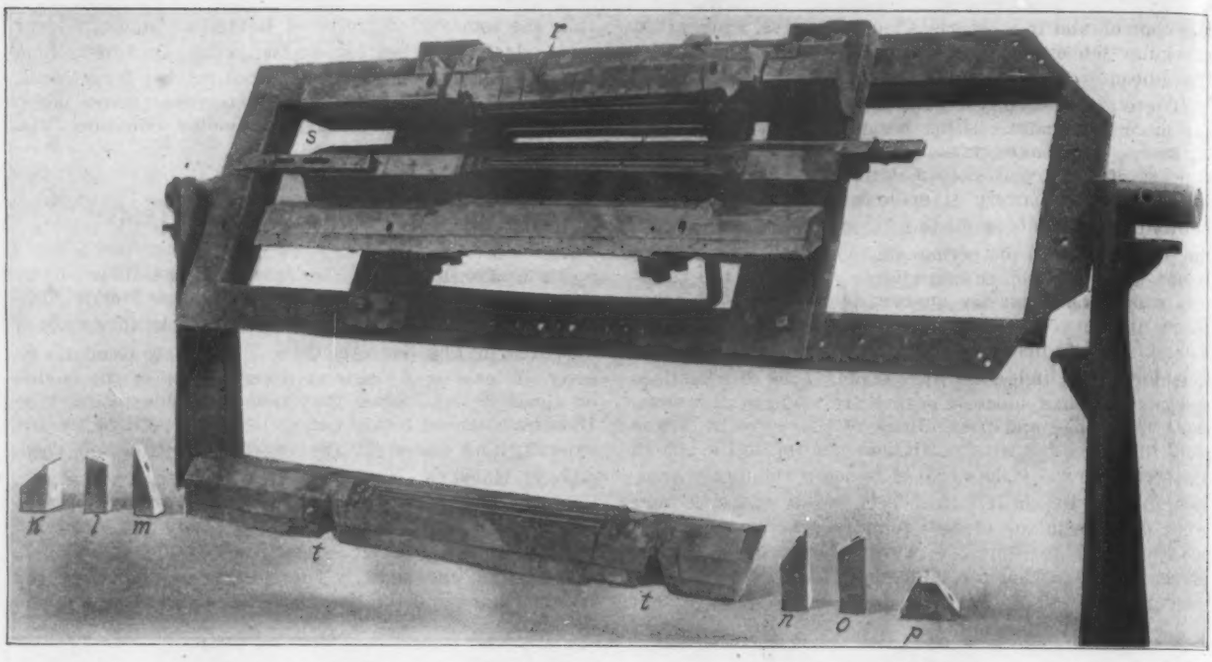


Fig. 4.—The Mold on Its Frame, with Gates and Vents.—Detachable Rake Pieces.

phosphorus and 0.45 manganese. The analysis of the balusters after they were taken from the mold showed 2.43 per cent. silicon, 0.66 sulphur, 1.42 phosphorus, 0.98 manganese, 0.42 combined carbon and 2.91 graphitic carbon. The fracture showed a fine close grained iron.

The hand ladles each held 25 lb. of metal and to this was added 2½ oz. of 80 per cent. ferromanganese, which was well stirred and skimmed before pouring, giving the very best results. The iron flowed freely and filled out into all the projections and undercuts of the ornamental parts.

Preparation of the Molds

All permanent iron molds should be properly proportioned to prevent them warping, twisting and opening at the joints. To prevent the castings sticking in the molds a mixture of graphite and machine oil should be lightly smeared over the cavity, but put on freely around the gates. Very few of our molds are machined in the cavities, but all the surfaces and the joints are planed or milled smooth and true. The cavities are carefully cleaned with the "skin" left on, as they stand up to the molten metal better. However, good results are obtained with the molds even when their cavities are machined all over. Iron molds are easily made, but care should be taken in molding them. We use a strong, tough, grained iron, with a facing varying in strength according to the size of the mold made.

Output

As stated, the balusters averaged 14 lb. each, and they were cast at the rate of 12 per hour, which amounts to 1680 lb. of castings in one working day of 10 hours in one mold. Considering that the rake pieces had to be set in and adjusted to make the various lengths required, and considering the high grade class of work when made in duplicate and in large quantities, such an output is remarkable, and made at the lowest possible shop cost. If these balusters were a standard product, the mold would have been equipped with quick locking device and the rake pieces fitted up with quick acting lever attachments. On small castings a greater output can be produced, and when there are no adjustments or changes the castings can be made as quickly as the molds are poured and emptied. The molds and cores work easier and better after they are heated up by the first few castings poured into them. Care must be taken to have the molds and cores perfectly dry and free from moisture. The cores work best when slightly smeared over with the graphite mixture.

An interesting fact was brought out when at first trying to pour the balusters on their ends. The molten metal in falling the length of the mold (about a 2-ft. drop), slightly wore away a projection on the head or capital of the balusters. A piece of Blue Chip tool steel was dovetailed into this part and no further trouble was experienced. It may be well to mention here that we have in constant daily use a pair of permanent molds, in which are made castings that have square sharp cornered ribs, raised up about the surface of the casting. The part of the mold that forms these ribs is made from Blue Chip steel, as cast iron will not stand up any length of time on the square sharp corners, and so far the Blue Chip steel is the best material we have yet found.

Cost of Molding

All the labor is unskilled, as any ordinary workman can be taught to operate the molds in a few hours, and on some small plain molds without cores in a few minutes. The castings require no tumbling or cleaning, excepting that around the gate ends these are sometimes slightly scaled and need cleaning occasionally. The difficulty of getting skilled workmen and keeping them satisfied is eliminated. Unskilled labor is easier to get

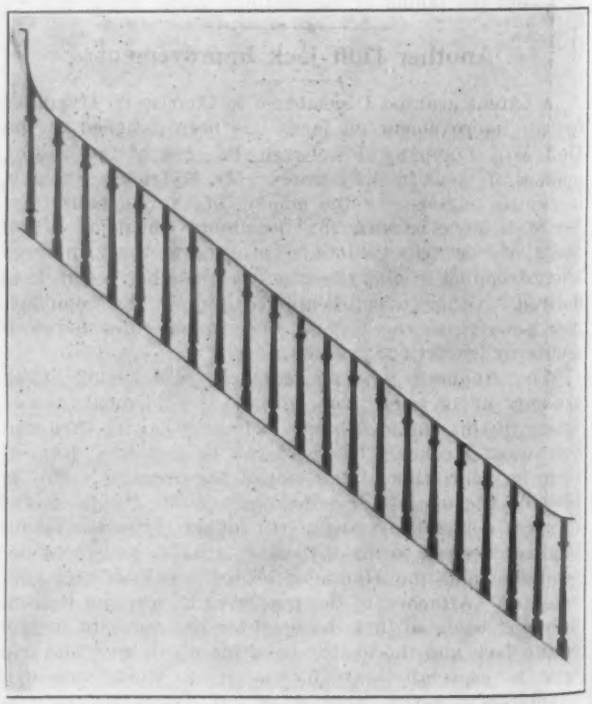


Fig. 5.—Section of Railing with Ornamental Balusters Connected to Channel Bar for Mahogany Hand Rail and to Flat Bar to Connect with Stringer.

and control, and in most cases more effective, when given a regular job or machine, with opportunities of promotion ahead.

There is the saving of flasks, sands and facings, with the labor of handling them, besides the cost of repairs on flasks, core boxes, fallow boards, molding machines, expense of core ovens, core making, &c. On most of our work a master pattern is made with double shrinkage allowed. From this is made a plaster pattern and from the plaster pattern the permanent mold is molded. There is but slight wear on these patterns. That for the balusters was modeled on one quarter or side only, the other three quarters were plain, so the cost of making the master and the plaster cast patterns amounted to little, considering the high class work made. Fine thin castings and castings of a superior nature are made by this process. The range and possibilities of the permanent iron mold in connection with continuous melting in the cupola are tremendous. It has proved to me a commercial success and in the near future will result in some very great changes in the present foundry practice and methods, especially for duplicate work on large quantities, as thousands of castings can be made in a single mold. The cost of the mold is little, considering the tonnage that can be turned out on regular standard lines of work; in fact, the mold cost would only amount to the fraction of a cent per pound of the castings made.

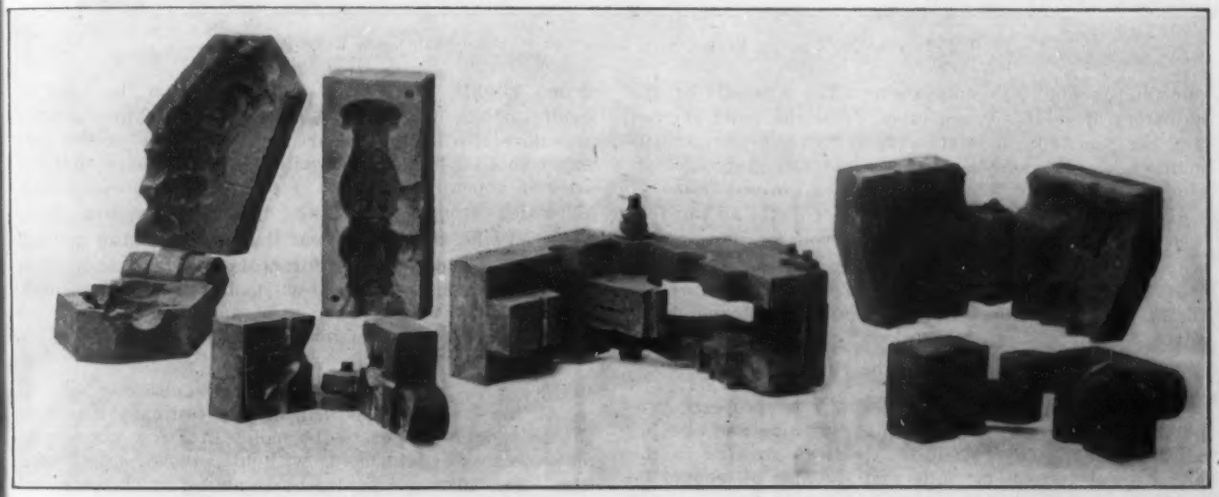


Fig. 6.—Dismounted Molds.

Another Duff Jack Improvement

A patent granted December 6 to Charles H. Hylander for an improvement on jacks has been assigned to the Duff Mfg. Company, Pittsburgh, Pa., one of the leading makers of jacks in the country. Mr. Hylander, who is a designing engineer in the employ of the company, perfected a novel device for the improvement of lifting jacks of the trip pattern. It prevents the trip lever from dropping in and releasing the raise bar before it is desired. Other patents, applied for by the company, now pending in the Patent Office, cover other improvements in its various jacks.

The standard type of Duff trip jack has a lifting capacity of 10 tons. The leverage is compound, double acting, lifting the load half a notch on both upward and downward strokes. The load can be instantly dropped from any elevation at the will of the operator. This is possible because of the trip lever. While the jacks are in great demand and are of the highest type, the manufacturer desired to make them even safer and more dependable, and the Hylander device was perfected and patented. Attached to the trip lever it prevents it from dropping back, so that the operator has absolute control of the jack and the load it is lifting all times. The trip jack is especially valuable in track work, although adaptable in many other ways. It has many features and has numerous types.

The Duff Company manufactures every kind of lifting jack used in any business. Almost 30 years have been devoted to the development and manufacture of jacks. It is the sole manufacturer of Barrett's automatic lever jacks, Duff ball bearing screw jacks, Duff-Bethlehem forged steel hydraulic jacks, geared ratchet lever jacks, automobile and motor truck jacks, telescope screw jacks, oil well jacks, pipe forcing jacks, motor armature lifts, traversing bases, &c.

Herrick Rotary Engine Tests

In a description of the rotary engine invented by Gerardus P. Herrick and controlled by the Herrick Engine Company, 74 Broadway, New York City, which appeared in *The Iron Age* June 2, 1910, an account was given of tests on a single cylinder pattern of the engine of about 20 hp. Since that time a double piston type Herrick balanced rotary engine has been built of 100 hp. capacity and tested at the Stevens Institute of Technology, Hoboken, N. J., by Prof. Frederick L. Pryor. The new engine differs from the earlier one not only in being larger, but in having two rotors, or revolving pistons, geared together so that their combined power is taken from one shaft. The action is similar to the earlier engine and the two pistons are served by a single valve chamber. As will be remembered, the main feature of the Herrick engine is the balancing of the rotor by steam admitted under it, so that there is no unbalanced thrust on the shaft in the first half of the stroke while the working pressure is on one side of the shaft.

The best steam consumption obtained with the 20-hp. engine running noncondensing and supplied with steam at 145 lb. was 50.7 lb. per horsepower per hour and when exhausting into a vacuum of 19.52 in. with a steam pressure of 115.2 lb. the steam consumption was 44.2 lb.

The 100-hp. double piston engine has lately been tested driving a 75-kw. 120-volt direct current Allis-Chalmers generator. The engine is rated at 100 hp. at a speed of about 800 rev. per min. when operating with dry steam at 110-lb. pressure and with a free atmospheric exhaust. In the tests the conditions nearest to these were: Steam pressure, 116.1 lb.; speed, 815 rev. per min.; brake horsepower, 114.9, at which the steam consumption per horsepower-hour was 38.4 lb. The lowest consumption was obtained with a steam pressure of 106.5 lb., a vacuum of 20.9 in., a speed of 816 rev. per min., and a brake-horsepower of 128, at which the steam consumption was 32.4 lb. per horsepower per hour. It will be seen that this is about 25 per cent. overload, according to the rated capacity. The efficiency of the engine increased from its smallest to its highest capacity. When operated at about half capacity, or 52.1 brake-horsepower, the steam consumption, running noncondensing, was 50.1 lb. per horsepower per hour. At 85.3 hp., somewhat over three-quarters load, the consumption was 41.6 lb., when running noncondensing.

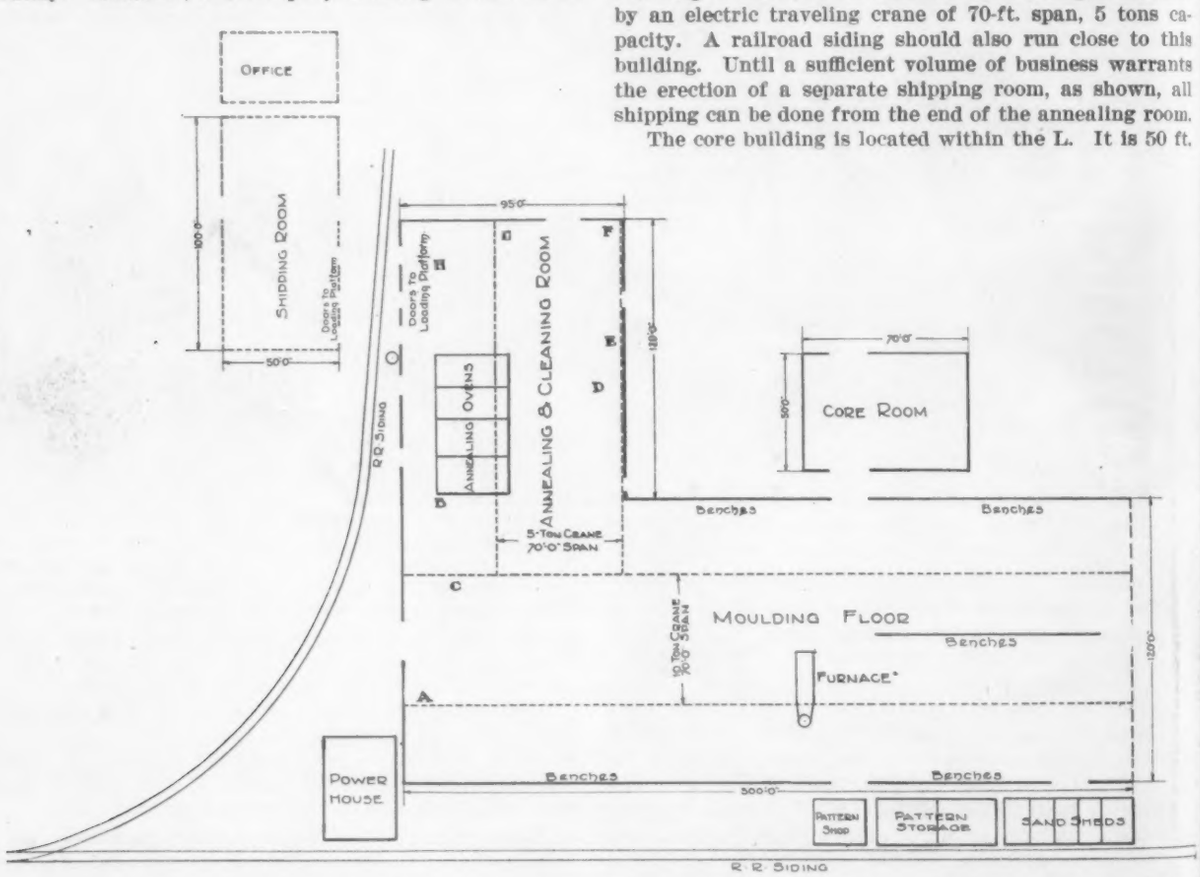
Within the next two or three months the Herrick Engine Company expects to complete arrangements for manufacturing the engine and is now ready to negotiate with engine builders with regard to rights to its use.

A Proposed Malleable Castings Plant

Layout, Construction and Disposition of Equipment in a Customs Foundry, Designed to Secure a Maximum Economy in Manufacture

BY "REAUMUR."

Often one reads of a new malleable foundry, "up to date in construction and fully equipped with the most modern and labor saving devices." But a visit to the plant will almost invariably reveal the old "rutty" construction and antiquated machinery. Where we usually find the best equipment is in the old plants of poor construction and arrangement. Of course all will not agree with the following plans and suggestions for a customs malleable foundry, but such a one, while the initial cost of construction and equipment is greater, will economize on labor sufficiently to easily pay interest on any extra outlay. Moreover, the company building it will be in position to secure and care for a larger volume of business, because of lower cost of manufacture and a better finished product.



General Arrangement of a Proposed Malleable Foundry Aiming at Maximum Economy in Handling and Manufacturing.

There is certainly no excuse for the old wooden structures, and no foundry should be built of anything but steel frame work. This gives a plant indestructible by wear or fire and is necessary when cranes are to be installed. The roofs should be of matched material and a good heavy ply of guaranteed and fireproof composition roofing. The walls of the foundry should be at least 16 ft. The roof of brick for the first 4 ft., and the remainder almost solid windows if molding benches are to be installed. The windows should be of wired glass set in steel sash; those in the cupola pivoted to swing. All buildings should be put up of material as fireproof as possible, especially the power plant and pattern storage, two vital points of any plant.

General Layout

The plant is laid out, as shown in the accompanying plan, in the form of an L, and all material is unloaded and handled so that from the raw to the finished product is a continuous and forward movement, there being no unnecessary handlings and no "going and coming back." For a one furnace plant, with sufficient molding space to take care of two, the foundry proper is 120 ft. wide by 300 ft. long, commanded by an electric traveling crane, 70-ft. span, 10 tons capacity. This building is paralleled by the railroad siding, along which should be plenty of space for yard storage. One end of the foundry, shown by dotted line, may be closed up only temporarily, thereby readily permitting extension. The annealing room is the wing of the L, 95 ft. wide and 120 ft. long, controlled by an electric traveling crane of 70-ft. span, 5 tons capacity. A railroad siding should also run close to this building. Until a sufficient volume of business warrants the erection of a separate shipping room, as shown, all shipping can be done from the end of the annealing room.

The core building is located within the L. It is 50 ft. wide by 70 ft. long and two stories. The mixing of sand, storing of material and stocking of cores are done on the lower floor, and core making and drying on the upper, an elevator being the means of carrying from one to the other. This is an especially good arrangement when girl core makers are employed, insuring privacy for them.

The pattern making and pattern storage buildings are located as shown, each of absolutely fireproof construction. In many plants owning and using patterns for specialties these are placed each night on rack cars and taken into the storage building. The power plant is located at the end of the foundry building, close to the railroad—*i. e.*, coal supply—though by all means a boiler should be attached to the stack of the melting furnace and the waste heat there utilized. The power plant should be equipped so that each machine or each set of machines is controlled individually by motors, a most profitable and sensible arrangement.

The office is located near the shipping end, its size and arrangement depending a great deal on the officers who will locate there, the method of doing business, &c.

No well equipped plant should be without a laboratory and at least a machine for transverse and deflection tests.

One thing of importance is sand storage sheds. These are next the siding and parallel the foundry building. They should be large enough for several months' supply of all kinds of sand, fireclay and firebrick, and built substantially enough to permit of being heated in winter to prevent freezing.

Equipment and Working Space

We will now consider the arrangement of equipment and working space. The foundry is purposely built wide, to allow molding stalls along each side and a double row down the center, on the far side of the melting furnace from the standpoint of the annealing room. This will make each floor 25 ft. deep and 10 ft. wide (this width preferred when casting only once a day), with a 10-ft. gangway.

The center benches are omitted on the opposite side of the furnace and that space used for floor molding, heaviest work nearer the annealing room. The melting furnace is situated about 130 ft. from the permanently closed end of the foundry and far enough in the shop to be controlled by the crane, and with a door from the stock yard near it.

The hard iron tumblers, in a single file at A, are so built as to enmesh singly and connected with a dust arrester. The dust arrester is put in a dead space near both hard and soft tumblers, a good place being about 6 ft. above the floor at B. At C are the hard iron sorting benches, and here is one place usually considered so unimportant in a shop that no attention is paid to it. But the benches should be raised, with a series of chutes at the back end. The sorter throws the castings and scrap into the proper chutes and spends no time or energy turning to the side or completely around. The chute leads to a barrel or a box with lugs and is taken away by the foreman or price checker, so that the sorter can be kept busy all the time. The writer has seen one sorter with such an arrangement take the place of three under the old method.

The packing of castings for annealing is done in front of the oven to be charged, an advantage of the wide annealing room. The ovens, four in a battery, have their charging ends under the control of the 5-ton electric crane. The soft iron rattlers are located opposite the ovens at D, arranged similar to the hard iron file, and the sorting is done as in hard iron on benches at E. At F can be located a straightening and test machine, small drill, &c. The grinding is done at G and the sorting and shipping at H.

For all work requiring sharp edges or to be plated, tinned, japanned or galvanized, a sand blast tumbler of approved type should be installed, and the finish thus obtained will secure a sufficiently higher price to more than pay for the equipment.

How the Economies Work Out

We will now follow the actual making of castings to learn the benefits of costly equipment, and the reasons for location of machinery, &c. Through each door runs an industrial truck operating throughout the stock yard. To set on small cars are iron bodies of 1 ton coal capacity, with one hinged dropping side; also heavy flat bodies of 5 tons pig iron capacity. In the iron car is shoveled a quantity of molding sand. It is pushed into the building far enough to permit the crane to pick it up, then distributed to the points desired. So all sand, fireclay, &c., are handled.

The pig iron is loaded on the buggies, run on a scale and set on the furnace by the crane. The sprues, having been collected from the ends of molding floors and taken to their tumblers by the crane, are dumped into the furnace by the crane. This manner of charging can be completed in 10 min. by the furnace labor alone, and thereby does away with the 10 to 20 chargers and their half hour's time. All bungs, too, are handled by the crane. The coal for the melting furnace is brought in 1 ton at a time, weighed and set on the horses, so that the fireman shovels direct from it, the side having been dropped, into the furnace, a great saving in space around a spot always too crowded.

The fuel for the power house and the annealing ovens is unloaded, so that it is practically ready to be fired, and no handling at these points is required.

The sand for the coreroom is taken by track and crane in the large buckets, so that the labor is very little on this item.

After pouring, the castings are knocked from the gates into piles at the end of the floors. But now, instead of a wheelbarrow or tale boxes, again the crane comes into use. A box about 14 in. deep by 4 x 6 ft. of good, stout lumber, is carried to the pile of castings and the latter are forked into it. So they (and the sprue mentioned before, which is cleaned as castings) are carried to the rattlers (one box having the capacity of a tumbler) and emptied in direct. The wooden box is placed beneath the mill and when the castings are cleaned they are dumped into it. The box is lifted by the crane and taken to C, where its contents are dumped on the benches. When sorted, chipped and counted or weighed they are taken in their containers to the packing floor. Here the pot bottoms have been placed in position by the crane. Now the first pots are brought from the pile at the end of the ovens or a newly dumped pile by the crane, and the packing goes on. When ready to load into the oven the pots, three and four high, are carried to the front, whence they are put in place by means of a steam truck or a specially designed hand truck, which can be run by three men. The oven door is of steel frame, lined with firebrick; it is set in place by the crane, daubed up, and the oven fired. It is really deserted looking in such an equipped annealing room, for so few laborers can handle the work ordinarily requiring many.

When annealed the pots are set out to be dumped in the same manner as put in, in front of D. The pots are lifted off the bottoms by chains, castings knocked out and the pots at once taken to be refilled or to the storage pile. The castings are forked direct into the tumblers and when cleaned are dumped into boxes and taken to E. Thus practically endeth the trip of the material—short and quick?

The cores are stacked in the first floor, as close as possible to the doorway, and loaded on racks set on a car. A large number of trays can then be carried at once into the foundry and distributed there, by hand or trolley. The core benches are set against the walls, in which are sufficient windows to give a good light.

Provision for Additions

The plant thus outlined can be added on to until finally the foundry occupies three sides of a hollow square and the annealing room the fourth. Hence the need for a separate shipping room. The coreroom is in the center of the foundry; the supplies can all be handled economically, and the shop is—that important desideratum—a unit.

One point to be emphasized is to build with an abundance of light and air and suitable lavatories and hygienic conditions for all employed; also to install a heating system. These all mean expense, but the firm will benefit by greater outputs from the employees, whose health is not broken by dust and darkness; by saving the losses due to ruined work done in shadows, and, finally, by having a satisfied, steady and loyal organization.

The British Government has just placed a contract with Cammell Laird & Co., Ltd., Sheffield, England, for building complete, including armor plate and armament, one dreadnought battleship, which will be the largest and most formidable of the battleships in the British navy. The cost will exceed $10,000,000. The displacement will be 24,000 tons and the engines will probably be of not less than 27,000 hp. Cammell Laird & Co., Ltd., have a branch in New York at 34 Cliff street, where they carry a complete stock of high speed, carbon and automobile steels.

The Screw Machine Products Corporation, Providence, R. I., will open a branch office in Detroit, Mich., January 9. John J. Flaharty, hitherto at Providence, is to represent the company as manager of the Western office.

Sound Business Methods in the Foundry

The One Great Need of the Industry—A Summary of Foundry Cost Elements with Illustrations of Their Application

BY ELLSWORTH M. TAYLOR.

In presenting this subject for discussion I do not wish to convey the impression that foundrymen do not know their business. On the contrary, it has been my privilege to look into the inside workings of a sufficient number of foundries in several sections of the country to be able to say that our foundrymen as a rule certainly do know their business, speaking solely of their ability to produce good castings.

But in every business proposition there is something else to be considered besides the ability to produce a good article, and that is the ability to market the good article at a profit. To accomplish this with any degree of certainty the foundryman must have adequate knowledge of sound business methods. My experience leads me to believe there is no other one thing which causes more inequalities in the status of different foundries than the lack of appreciation of "sound business methods."

I am well aware of the publicity the subject has received in the past few years, and I know foundrymen as a body have given and are giving the matter their serious attention. But it is hard for many of us to get out of a rut; and usually something has to give us a good hard jolt before we force ourselves to adopt measures which we have felt for a long time would be good for us.

A Hereditary Industry

It is easy to understand why this is exemplified in the foundry industry. Until within a very few years many were in it through inheritance. Information of the trade was passed along from father to son for generation after generation. Outsiders were not received with open arms. In his training the son, as was the case with the father, was taught practical things. He learned how to use his hands, to mix sand, to make a mold, to melt pig iron and to make a good casting, many times with practically loose boards for a pattern. Thus throughout his apprenticeship his attention was directed to physical things, and he learned to master the materials nature gave us for making castings—those elements which he could see and grasp with his hands. This, then, was the foundryman's world, his education and primarily his business. And beyond this line he had very little opportunity or desire to roam.

The Old Way of Making Prices

When it came to making a sale or putting in a bid for business he lived up to his training; and in deciding on the selling price he used those things which he could see and grasp with his hands. He knew approximately how long it would take to make the mold, what he had paid for his pig iron and possibly one or two other items which he could see. He added these amounts together, and then he hesitated, because he had reached the dividing line between those elements in the business which he could see and grasp and those which he knew existed and must be considered, but which his training had never taught him how to grasp with his hands and hold right up before his eyes. And then he did what any other mortal man would do under similar circumstances. He added to the cost of those elements which he could see, some arbitrary amount which he hoped would cover the items he was unable to grasp, and give him a profit. Or perhaps he was told that Smith would make the casting for 3 cents a pound. So he said: "All right, if Smith can make the casting for 3 cents a pound I guess I can. Give me the order."

This was the situation for years. The men in the foundry industry who knew how to produce good castings formed a sort of close corporation to see that no outsiders should get the information, and then turned around and sold their good product at practically whatever they could get for it.

Finally, the great growth in the machine shops and mills of the country forced the shop man either to build his own foundry or to take a greater interest in the affairs of foundries already established. In this way men were brought into the foundry industry who were not in the habit of selling goods at any price they could get for them. They wanted information as to the soundness of an investment in the foundry industry; and they were forced to the conclusion that the great body of foundrymen had very little knowledge of those things which directly affect the financial end of the business, and were making prices which not only endangered the prosperity of their particular properties, but also the livelihood of every other foundryman in their immediate vicinity.

An Educational Influence

After a time, as if in answer to the need, there sailed into view on the horizon a staunch little craft with the name "American Foundrymen's Association" written across her bows and the flags of publicity and knowledge floating from her masthead. As a result of the advent of this little ship, the foundry industry has been greatly benefited. Among other things the foundryman has been compelled to give attention to sound business methods, with which he was formerly not on very good terms. He has learned that there is such a thing as the true cost of castings, and that all the elements which go to make up this cost may be reduced to tangible form and held right up before his eyes so that he may see and grasp them.

But in spite of the wide publicity which this phase of the subject has received there are still too many foundrymen who are taking orders at any price, and who stick to arbitrary "rule of thumb" methods of arriving at it. Down in their hearts they know these methods are wrong or inadequate, but, like the foundryman of old, they hesitate when they reach the point of dealing with those elements which they cannot see or grasp, or else are satisfied to delude themselves into the belief that these elements do not affect the results.

Losses Stopped by Cost Study

If I could do so consistently I would like to give here some of the facts which have developed in foundries where all the elements of costs have been reduced to concrete figures and a comparison made between the true costs of the product built up therefrom and the old costs, which had been made up from erroneous or distorted elements or by some clairvoyant method. However, it may be stated that in every case that has come to my attention it has been proved that, even though the foundry, continuing in the old way, might have made some money on its entire year's operations—and this has not always been the case by any means—there were certain orders or period contracts on which it was steadily losing money in amounts running from hundreds to thousands of dollars annually. In many instances as soon as the facts were incontrovertibly established it has been possible to reduce the losses to a minimum figure or to eliminate them altogether.

Some Modern Instances

Take, for example, the case of a jobbing foundryman doing a fair volume of business, and far-sighted enough

to see there is likely to be a great demand for a certain line of castings, due to the unprecedented growth of a large industry. Suppose this foundryman should go ahead and perfect his physical processes to a point enabling him to produce the line in time to meet the demand, and his product from the standpoint of workmanship and quality is second to none. Along comes the manufacturer and says: "Those castings are beauties. I want some of the same kind. How much?" "Four cents a pound," replies the foundryman, basing his price on misunderstood cost elements. Then he takes steps to find out what the real cost factors are and finds that every pound of those beautiful castings actually costs him 6 cents.

Take another foundryman who has the chance to contract for a large tonnage over an extended period, and who thinks if he can only get that order he will be able to add a few hundred dollars to his profit. He is not sure of his elements of cost, but lands the business, and later on finds he has loaded up his foundry with a loss on every ton that goes over his scales.

Take the case of the foundryman who has a reepresentative number of customers. Some of his contracts are made on a flat rate for the entire tonnage sold; some on a variable scale according to weights and classes of castings; some at fixed amounts for individual patterns, and some at a fixed percentage of "profit" to be added to the cost of the castings produced. Suppose such a foundryman is not operating his property in accordance with sound business methods; suppose he does not know what his true cost elements are and how to use them; what is likely to happen to him?

Instances like these make a man stop and think, and I have seen enough of the inside workings of foundries to know that many a good casting to-day goes over the scales for which the foundryman never receives the true cost of production, and probably never will until he changes his business methods. Strange, is it not, that an owner or manager will rush out into the foundry and tear things to pieces because some one has spoiled a casting by using too small a core, and then will go back to his office and pat himself on the back for getting an order when he has actually charged less than the castings cost? Which is the more culpable—to lose a casting once in a while or to be so indifferent to true cost factors and methods that it is only a stroke of luck if you do not happen to sell the best casting ever made for less than the cost of production?

I want to say that it is the duty of every foundry owner and manager to know what his castings actually cost. It is a duty which the foundryman owes not only to himself but also to the molders, the laborers and all others whose livelihood and welfare depend upon the permanency of the industry of which he is the responsible head.

Not Red Tape

Perhaps some foundrymen regard sound business methods as red tape. If they were red tape, as they are not, I should unhesitatingly advise foundrymen to go in for all the red tape they can get their hands on. If there must be a day of reckoning, it is much better to be able to blame the catastrophe on red tape than to be compelled to admit that we do not know how it happened.

As a matter of fact, sound cost methods are within the reach of all foundrymen. When once we get to know them we wonder how it was that they ever escaped our notice. When the ordeal of a formal introduction is over we learn to regard them as earnest, sincere, efficient friends. They save us from many a false step, and they are simple and direct. They can be understood and grasped by the average intelligence when once we are put on the right track.

I know of an instance where a concern engaged primarily in the foundry business installed a sound cost system which made each department stand on its own feet. The methods were made so simple that it was possible for a clerk in the establishment, who was only indirectly connected with the installation, to elucidate them in a magazine article as a sample of sound practical methods—the same as if he had conceived the scheme and had recommended similar methods over an extended period.

Elements in a Sound Cost System

Now let us give attention to the elements of sound foundry cost methods themselves. A few years ago our old friend, the American Foundrymen's Association, gave some attention to these matters, deeming them of vital importance to the foundry industry. A committee composed of men representing various branches of the industry met together and as a result a formula was adopted setting forth in proper order the elements which go to make up the true cost of a casting, and showing how the facts must be applied if a foundryman desires to know what he is doing. Possibly some foundrymen may be helped by going over the data, and I will accordingly repeat herewith the recommendations which this ocmmittee made, combined with a memorandum which was submitted at the same time:

SUMMARY OF FOUNDRY COST ELEMENTS.

1. Total good castings produced.
2. Cost of metals used.
3. Cost of direct labor.
   - Molders.
   - Molders' helpers.
   - Apprentices.
   - Coremakers.
   - Coremakers' helpers.
   - (And all similar labor capable of direct charge to any particular order or contract.)
4. Cost of indirect items divided into—
   (a) Burden items to be distributed on basis of weight of good castings:
   - Cupola costs.
   - Molding supplies.
   - Flask costs.
   - Yard charges.
   - Cleaning costs.
   - Core supplies and expense.
   - (And all items of a similar nature.)

   (b) Burden items to be distributed on basis of cost of direct labor in a casting:
   - Office and clerical charges.
   - Foremen, &c.
   - Miscellaneous foundry labor and expenses.
   - Rent, &c.
   - (And all items of a similar nature.)
5. Total cost of output.
6. Commercial costs. Selling expenses of every nature, including advertising, &c.
7. Gross cost of output.
8. Net cost of metals used per pound of good castings (obtained by dividing item 2 by item 1).
9. Burden charge to be distributed to individual costs on a basis of per pound of good castings (obtained by dividing item 4a by item 1).
10. Burden charge to be distributed to individual costs on a basis of per cent. of direct labor (obtained by dividing item 4b by item 3).

The examples given in this schedule illustrate the classification of costs necessary for all kinds of foundries. It is absolutely essential that every foundryman should know and use these elements in estimating his costs. It is necessary, of course, in some instances to modify the arrangement to meet individual foundry conditions. But all sound foundry cost methods are built upon the elements set forth in this schedule. They may be enlarged upon or subdivided to meet the requirements of the most exacting nature, which is some times a good thing to do, but in any event the correct principles are there, and that is the essential feature.

Application of the Cost Schedule

In closing, let us show briefly how the foundryman may use this schedule. Suppose he wants to know:

(a) What is the gross cost of production? See items 5 and 7.

(b) How should we figure the cost of an individual casting? Multiply the weight of casting by item 8. Get the cost of the direct or applied labor used to produce the casting. Multiply the weight of casting by item 9. Multiply the direct labor by the percentage rate obtained by item 10. The total of these amounts is the cost of the casting up to the shipping office door. Add the proper proportion of item 6.

In apportioning the commercial cost to the classes into which the product may be divided, the unit of distribution should be made up on a basis of equity, taking into consideration the real conditions governing the sale of

each class, such as the amount of sales, the costs up to the "Commercial Cost Section," the difficulty in making sales, the volume of advertising, &c.

The total is the gross cost of the casting.

(c) Suppose it is desired to divide the production into two or more classes; say, for example, "heavy work" and "light work," so that we may obtain the average cost of these classes without getting the detail cost of each casting. Separate item 1 into "heavy work" and "light work." Keep a record of amount of item 3 used for each class. Then proceed exactly as outlined for (b).

(d) Suppose it is desired to secure the cost of Smith's work, Jones' work and Brown's work, to find out which is the most profitable, and without getting the detail cost of each casting. Separate item 1 according to customers. Keep a record of amount of item 3 used for each customer. Then proceed exactly as outlined for (b).

The Progress of Mechanical Engineering in the Foundry

With Special Reference to the "Continuous Pouring" or "Mechanical Handling" System—Some Malleable Foundry Improvements

BY GEORGE K. HOOPER.*

Such progress has resulted from the attention given to mechanical engineering, as applied to foundry necessities, that it is probable that few large foundries are now constructed which do not embody to a considerable extent the substitution of machinery for manual labor in some processes; and practically all large manufacturing concerns are remodeling their iron foundries for operation on what is designated the continuous pouring or mechanical handling system. At the risk of going over old ground, I will say that this system comprises the melting and pouring of iron throughout the entire working day, with the handling of sand, molds, flasks, cores and castings by means of conveying machinery.

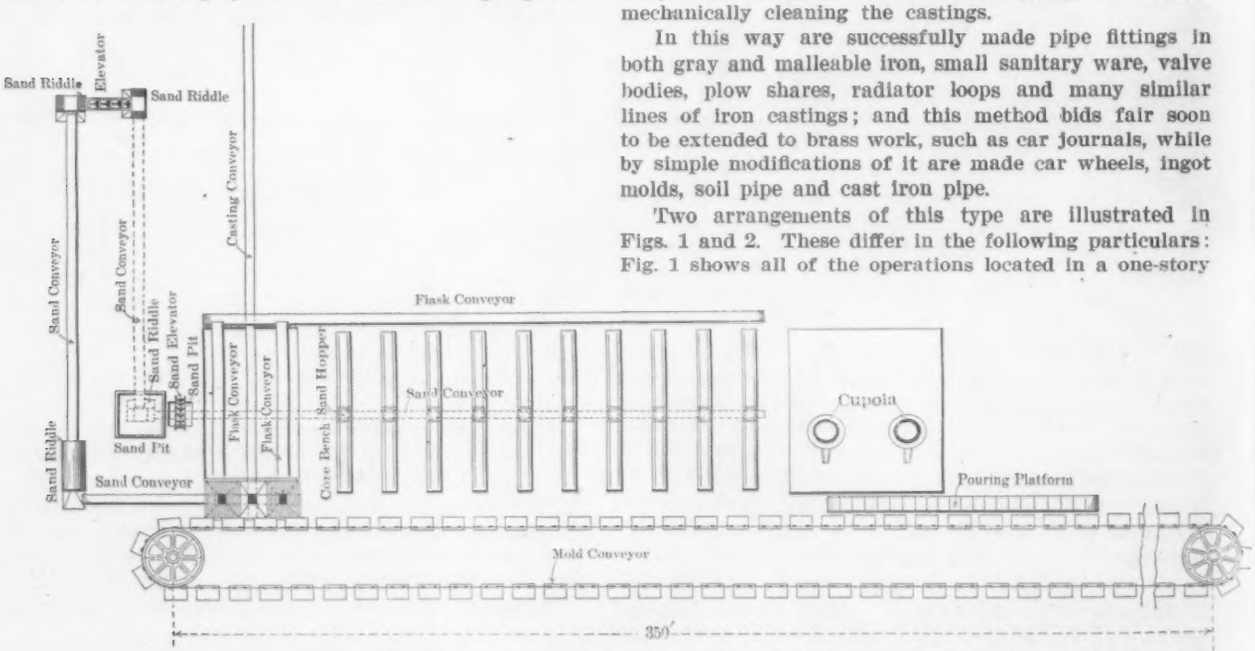


Fig. 1.—Arrangement of a One-Story Continuous Foundry in Which the Molds Are Carried to the Iron.

The "Continuous" Foundry in Which the Molds Are Carried to the Iron

The continuous foundry has embodied itself naturally in two types, the first being that most advantageously used by manufacturers of a specialty in which a few standard flasks may be made to accommodate all of the patterns which are run, and the second and later development, that in which a large number of flasks of differing size are necessary and the castings produced vary considerably in pattern and size.

The development of the first type, or that in which the molds are carried to the iron, has been fairly well standardized. It comprises means for carrying flasks to and from a pouring point, usually at or near the cupola, coupled with which conveying is sufficient time allowance for cooling to enable the casting to be shaken out without injury. Means are also furnished for shaking out the mold, with a separation of sand, casting and flask; means for cleaning, cooling and tempering the sand and returning it then to the molding machines or floors; means for taking the flasks back to the molding machines and floors, and means for removing, cooling and often of mechanically cleaning the castings.

In this way are successfully made pipe fittings in both gray and malleable iron, small sanitary ware, valve bodies, plow shares, radiator loops and many similar lines of iron castings; and this method bids fair soon to be extended to brass work, such as car journals, while by simple modifications of it are made car wheels, ingot molds, soil pipe and cast iron pipe.

Two arrangements of this type are illustrated in Figs. 1 and 2. These differ in the following particulars: Fig. 1 shows all of the operations located in a one-story building, the product being so bulky and heavy that it is not well suited to handling by gravity from an upper story to lower floors. Fig. 2 shows an arrangement with the foundry operations on the second story of a two-story building. The product is such that it may safely drop by gravity to the ground floor for subsequent operations and storage, and the saving in handling offsets profitably the excess cost of a two-story over a one-story building. It is obvious that such a foundry might, as is frequently the case, be placed on the upper story of a building of sufficient number of stories to suitably house all the operations required by the product.

The "Continuous" Foundry in Which the Iron Is Carried to the Molds

The second type, or that in which the iron is carried to the molds, has not so far been well understood as a type and therefore has not met with the favor which should belong to it. Attempts have been made to adapt it without suitable study of its requirements and limita-

* Consulting Engineer, 165 Broadway, New York.

tions and there has been consequent disappointment in results. Such a foundry comprises molding floors suitably arranged and provided with overhead travelers for handling large and heavy flasks and castings; tracks for bringing molten iron from the cupola to the floors; gratings in the floors on which the castings may be shaken out, and means for collecting the shaken out sand and returning it to the molders or molding machines.

This type of foundry has not yet reached its best development, and, as it has heretofore been constructed, involves a serious cost for labor and overhead cost for building; but it is a meritorious step in the right direction, and it is very probable that the next few years will see a considerable number of iron foundries of this type installed, with some if not all of the present faults corrected. These have been, in addition to those mentioned above, the serious congestions involved in making molding floors too narrow for the work and in having passages clogged by conflicting currents of filled and empty ladles, cores, castings, patterns and flasks.

Pump parts and transformer cases are being made in this way, with attempts at other forms of castings, but many changes are necessary in this type before it realizes all of the advantages which belong to it. Some of the changes predicted are: Mechanical handling of sand to save room and labor; different proportions of story hight to make much otherwise wasted space available, saving thus carriage, labor and room; better proportions of molding floors and gangways to prevent conflicting currents of work and material, and sufficient mechanical means of handling full and empty ladles to and from the floors. An improved arrangement is shown in Fig. 3, which is a design recently made for a well-known concern.

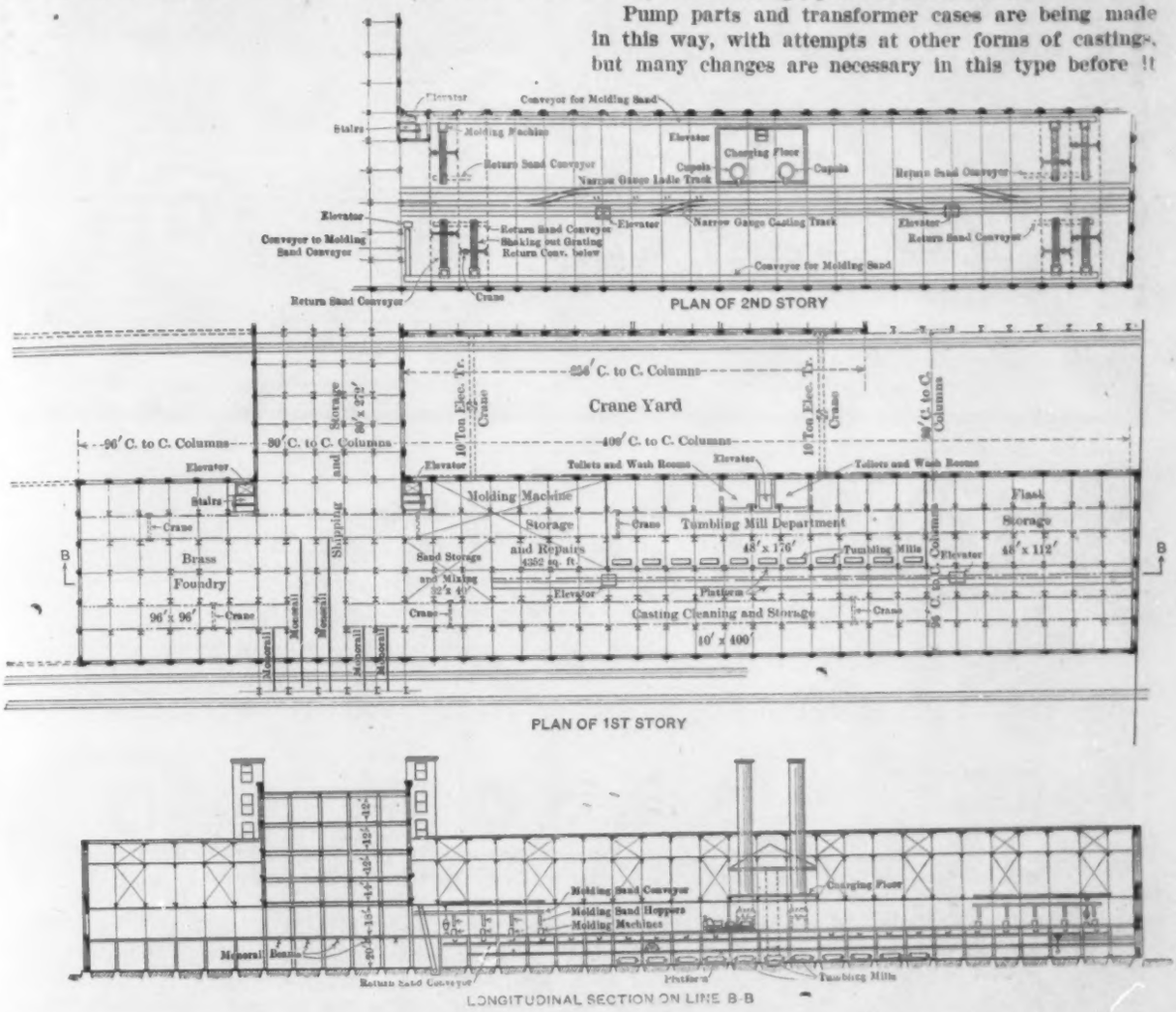


Fig. 2.—A Two-Story Continuous Foundry, Making Cupola Malleable Castings, in Which the Molds Are Carried to the Iron.

Future progress in mechanical engineering in the gray iron foundry seems to lie in the direction now being successfully tested, of permanent molds. Here the skill of the engineer and metallurgist combines to reduce materially the labor and cost of manufacture, while an improvement in the physical characteristics of the product results as well. In some measure this change in physical characteristics will extend the field of the gray iron casting, making it available for other uses where previously a different and more expensive form of metal would be necessitated.

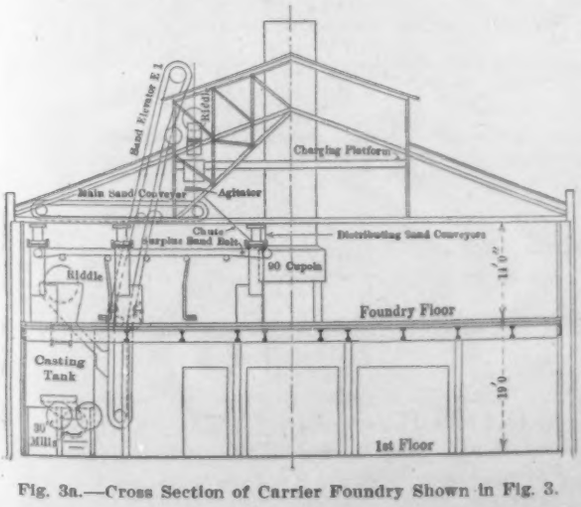


Fig. 3a.—Cross Section of Carrier Foundry Shown in Fig. 3.

Mechanical Handling in Malleable Foundries

No attempt has yet been made to apply either of the forms of the continuous foundry to the production of malleable iron as melted in the reverberatory furnace, but there is reason to believe that this can be successfully done when the furnaces can be so proportioned to the work that the heats may be drawn off from one furnace after another with a fair degree of continuity. An attempt has been made at mechanical handling in the malleable foundry in the production of journal boxes

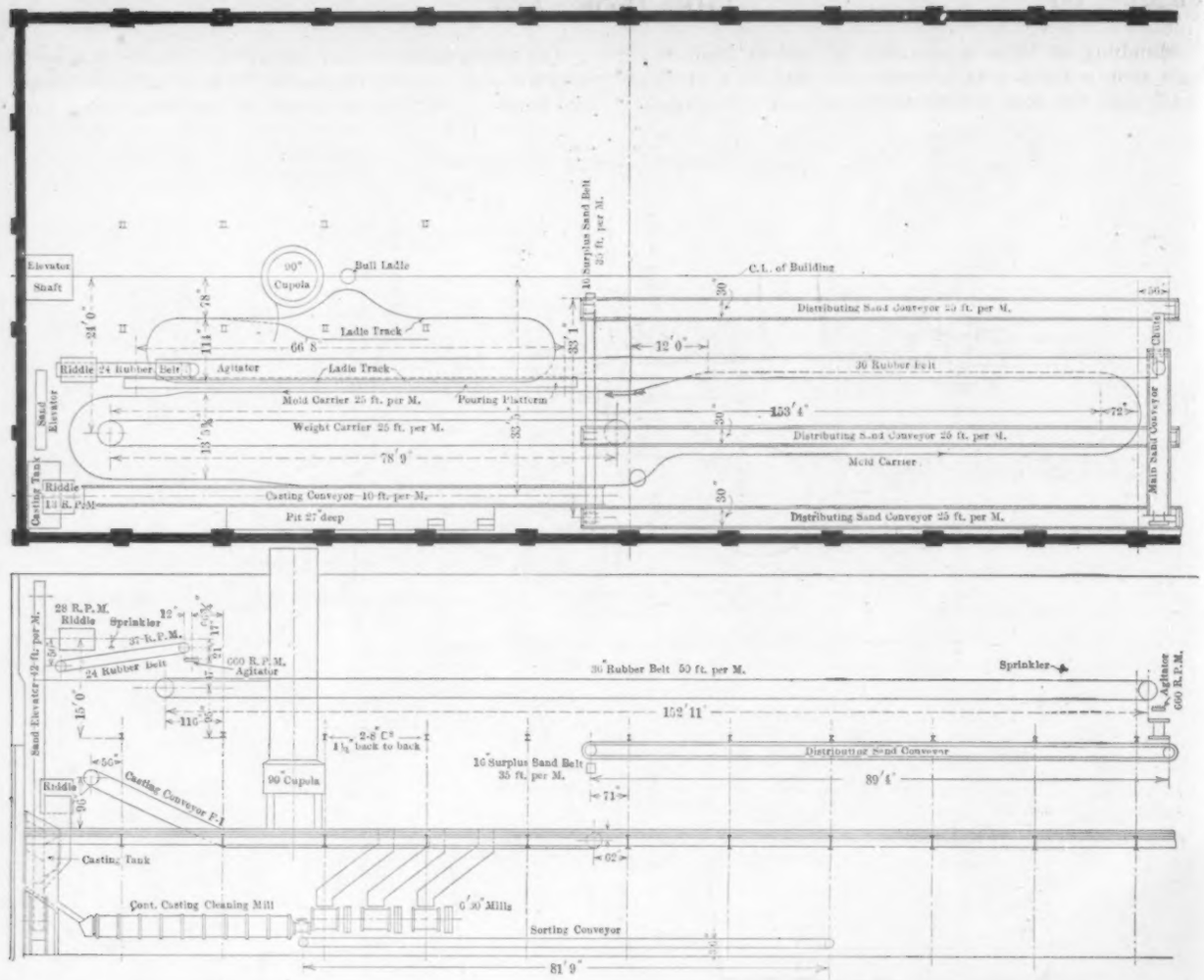


Fig. 3.—Plan and Longitudinal Section of a Continuous Foundry in Which the Iron Is Carried to the Molds.

and this is working out slowly to so reasonable a measure of success as to prove the attempt warranted. In "cupola malleable" the first type has long been a success, Fig. 2 showing a plant already operating on cupola malleable castings, and many such plants are in operation on pipe fittings with others projected.

LARGE REVERBERATORY FURNACES.

In the malleable iron foundry, mechanical engineering progress is resulting in the construction of larger furnaces, so that a reverberatory furnace holding 45 tons to a heat is now a practical success, and can be used on natural draft for the production of a very "high" and fluid iron. Mechanical stoking for such a furnace is a great need which has not yet been successfully met, since to bring down so large a melt requires about the maximum physical exertion of which one fireman is capable.

Mechanical charging for such a furnace is an entire success, it being now possible to construct so wide a "bung" as to utilize the full efficiency of overhead cranes and reduce the time and work of opening such a furnace to a minimum. The difficulties predicted from unevenness of distribution of charge due to mechanical handling have not made their appearance. The wide bung also brings a small economy in fuel, the number of joints through which heat may escape from the top of a furnace the narrow bung. Fig. 4 shows a design of wide bung which has been in successful use for about a year.

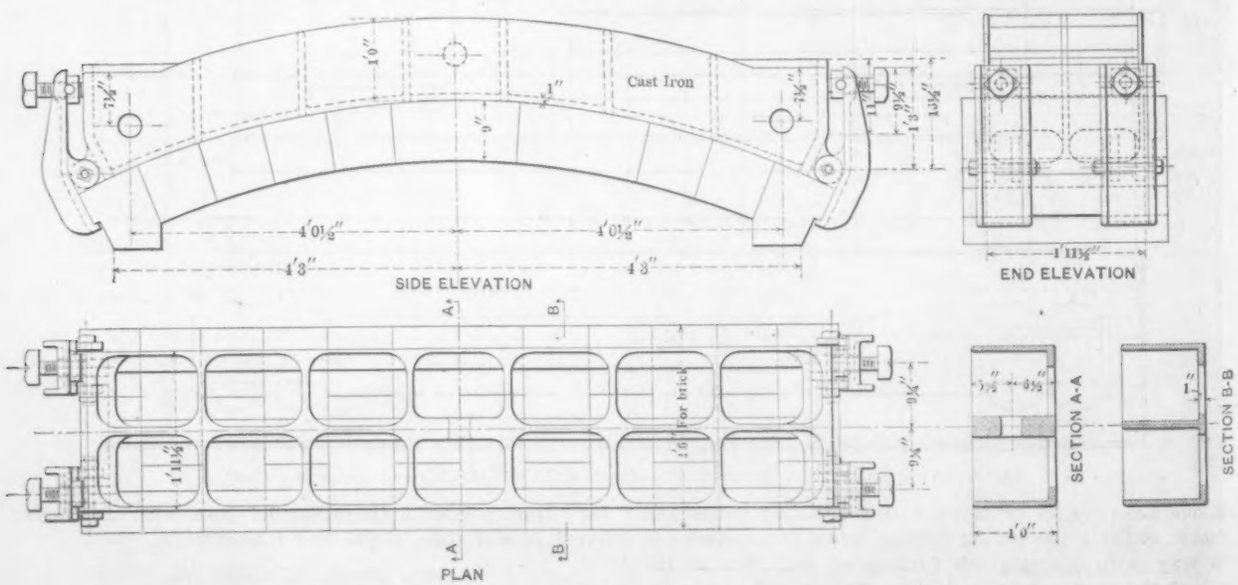


Fig. 4.—A Design of Wide "Bung" for 30-Ton Reverberatory Furnace, Facilitating Mechanical Charging.

Handling so large a quantity of melted iron away from such a furnace in a reasonable time is a problem which also has been satisfactorily met. A tilting spout,

The tilting spout is also applicable to the open hearth steel foundry, making it possible to draw off the charge into several small ladles instead of one large one. The

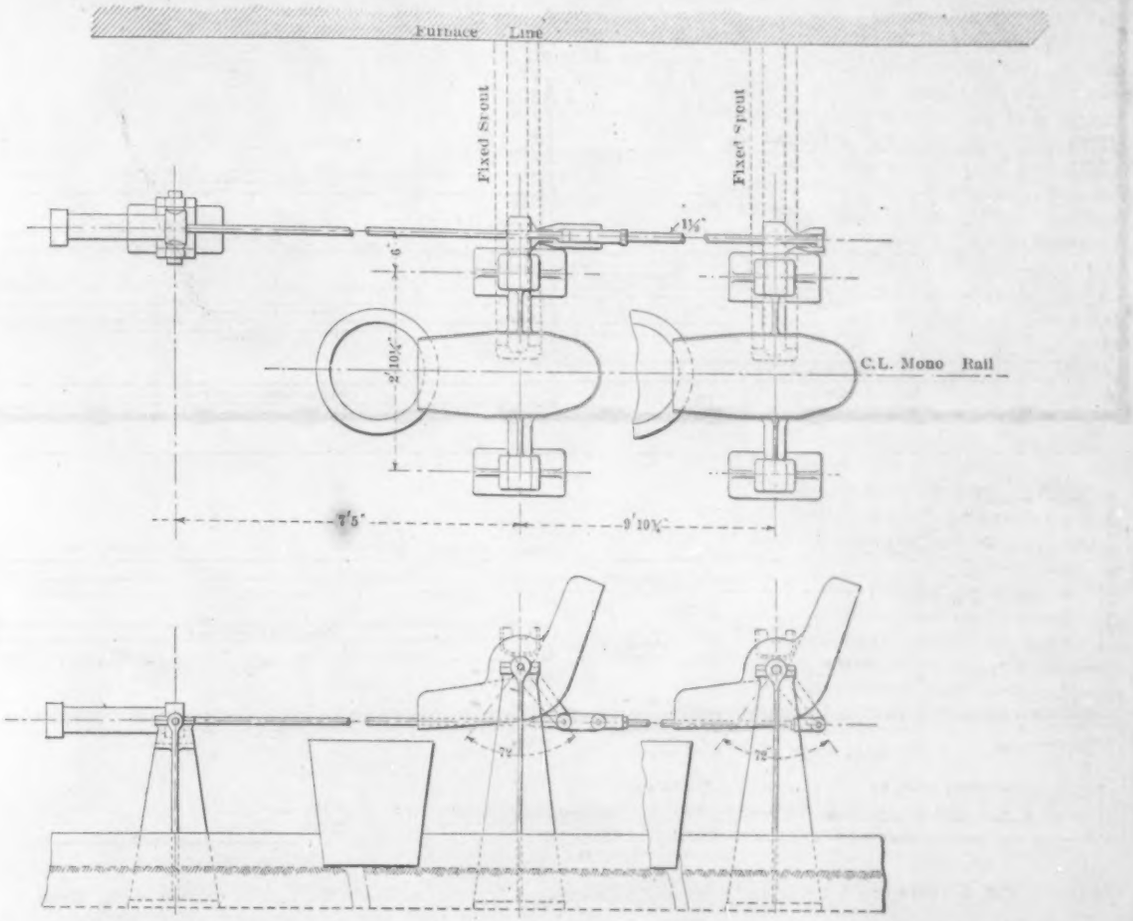


Fig. 5.—Tilting Spout for Reverberatory and Open Hearth Furnaces, Facilitating Rapid Handling of Molten Metal.

shown in Fig. 5, has been developed, which renders being but a small fraction of the number necessitated by it possible to drain so large a furnace in a minimum time, this spout automatically making room for the use

strength of the building necessary to support a large ladle crane is thereby reduced, and the time of pouring is shortened, as this operation can be carried on from several ladles instead of one, thereby saving the "teeming" from a large ladle to smaller ones, with the consequent loss of time, metal and temperature.

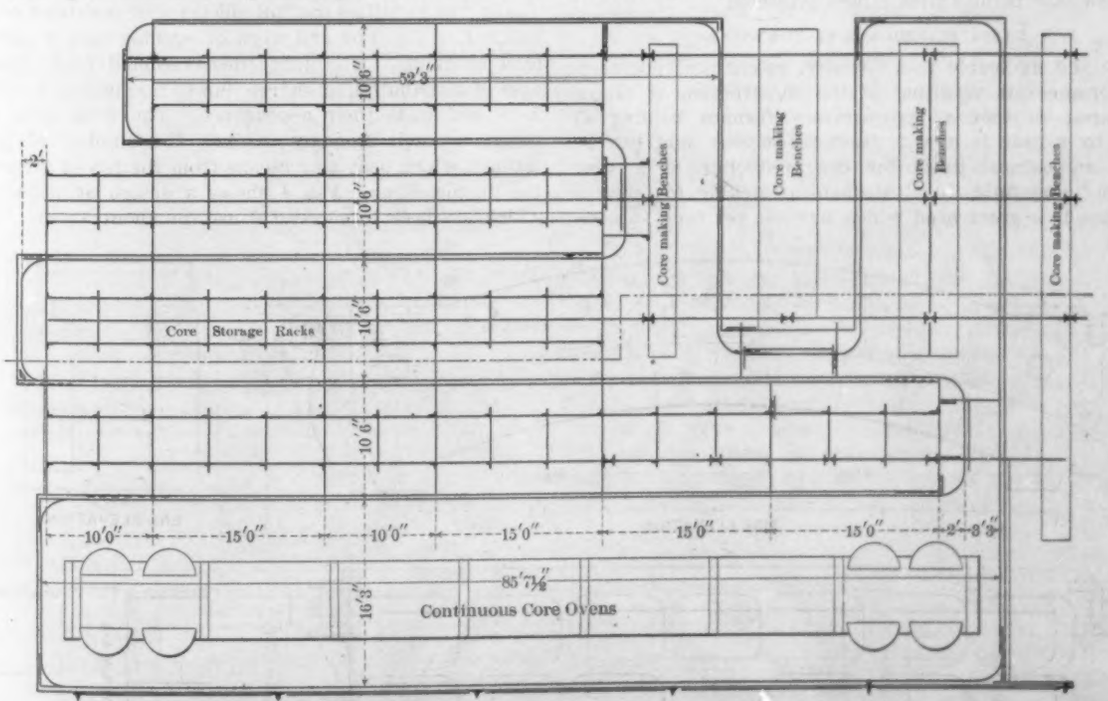


Fig. 6.—Arrangement of Continuous Core Ovens and Core Making and Conveying Plant.

of overhead cranes or travelers for handling ladles and almost entirely preventing "spill," while it interferes in no way with draining the furnace of slag, &c., at the end of the melt. Such a device prevents to a large extent the burning of the iron after the desired temperature and composition have been attained in the furnace.

BETTER ANNEALING FACILITIES.

Further, in the malleable iron foundry we now have the mechanical handling of "stacks" by means of steam.

driven charging machines, enabling a saving not only in handling cost and space, but as well enabling the size of annealing ovens to be increased, thus further saving space.

The mechanical handling of annealing scale seems also to be now an assured success, and complete systems have been developed for this work, comprehending the catching of the hot scale as it is shaken out of the pots and stacks, removing the dust and dirt from it, crushing the lumps and distributing it in suitable overhead bins, whence it may flow by gravity for further use in packing castings. The old annealing room, with small ovens, heaps of scale dust and heat, is practically a thing of the past.

For handling the heated scale a new type of conveyor has made its appearance, involving no moving parts, no axles and wheels, no sprockets and chain and no buckets, promising thus a minimum of maintenance expense; moreover, its power consumption is low.

With the large annealing oven has come the generation of the necessary heat by means of pulverized coal, and this system may be accounted a success for this purpose. The question of air pressure and proper fineness of the pulverized fuel are well worked out, and no reason exists why this system should not be widely extended for this work.

For the steel foundry the mechanical development of the small converter into sectional form has won success, rendering this device available for a greater number of heats with a smaller time out of service for relining, this assisting as well to reduce plant cost by rendering duplication of converting equipment unnecessary.

Continuous Core Making

For foundries of any type making large numbers of cores of sizes not greater than can be easily carried by one man or youth there is available the core carrying conveyor, which takes green cores from the benches to the ovens, and thence, after cooking, to storage racks and washing equipment, returning then the empty plates, driers or core boxes to the benches for further use. Such a core making and conveying plant is shown in Figs. 6 and 7. Surprisingly little breakage to green cores results from this handling and the economy of labor is great.

With such carrying systems are used continuous ovens of types shown in Figs. 8 and 9. The first of these is best adapted to the use of waste heat from annealing or other furnaces. The second is fired directly by oil or gas, as best serves. The second type possesses the advantage of having no machinery in the heated space, and requires no power to drive; it also has the great advantage of enabling any core to be withdrawn when properly baked, saving thus in time and controlling the baking of cores, while not in the least detracting from the continuity of operation.

The Jarring Type of Molding Machine

The importance of the molding machine to the foundry has been greatly enhanced by the study given to the development of the "jarring" machine, and the improvements made in the type by the studies of an eminent mechanical engineer. He has produced a machine, which in addition to absorbing all of its energies within itself, has also increased the efficiency of operation of the type. It has long been recognized that the condition of the mold made upon the jarring machine is superior to and more nearly approaches the ideal condition of a sand mold

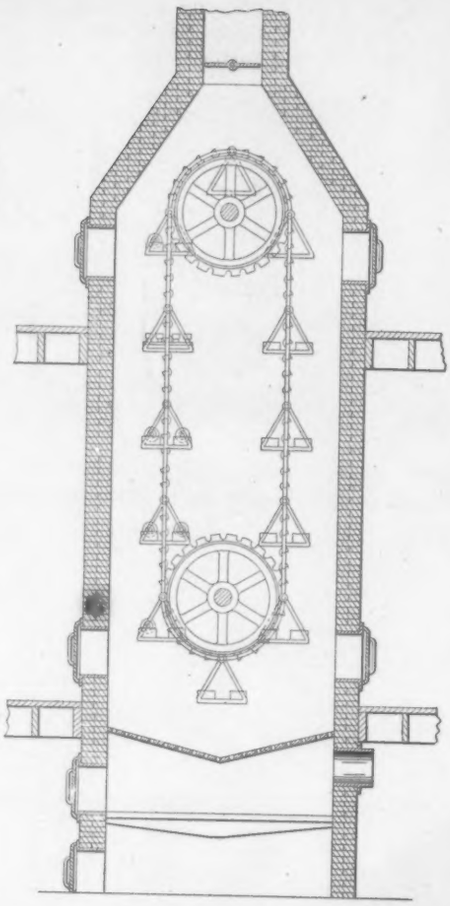


Fig. 8.—Continuous Core Oven Adapted to the Use of Waste Heat.

than that produced by any other method of ramming; in addition to this, the ramming operation is more quickly and cheaply performed than by other mechanical methods.

The shockless jarring machine gives us now all of

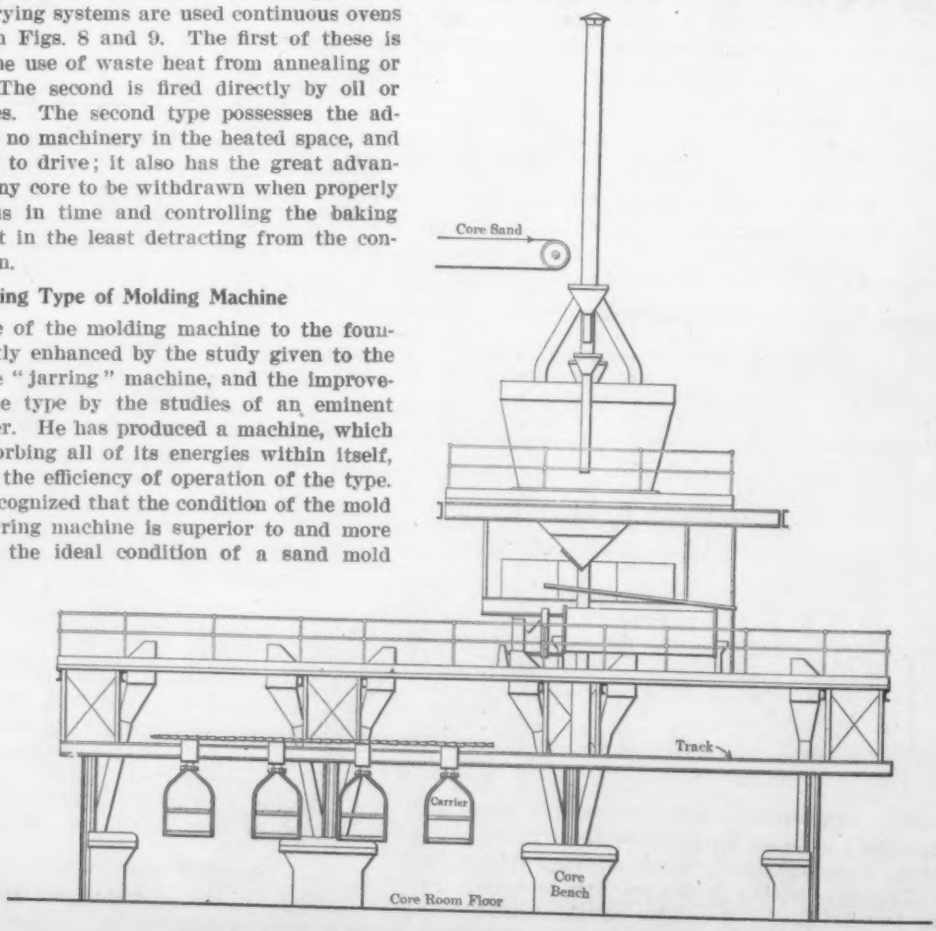


Fig. 7.—Elevation of Core Carrying Conveyor.

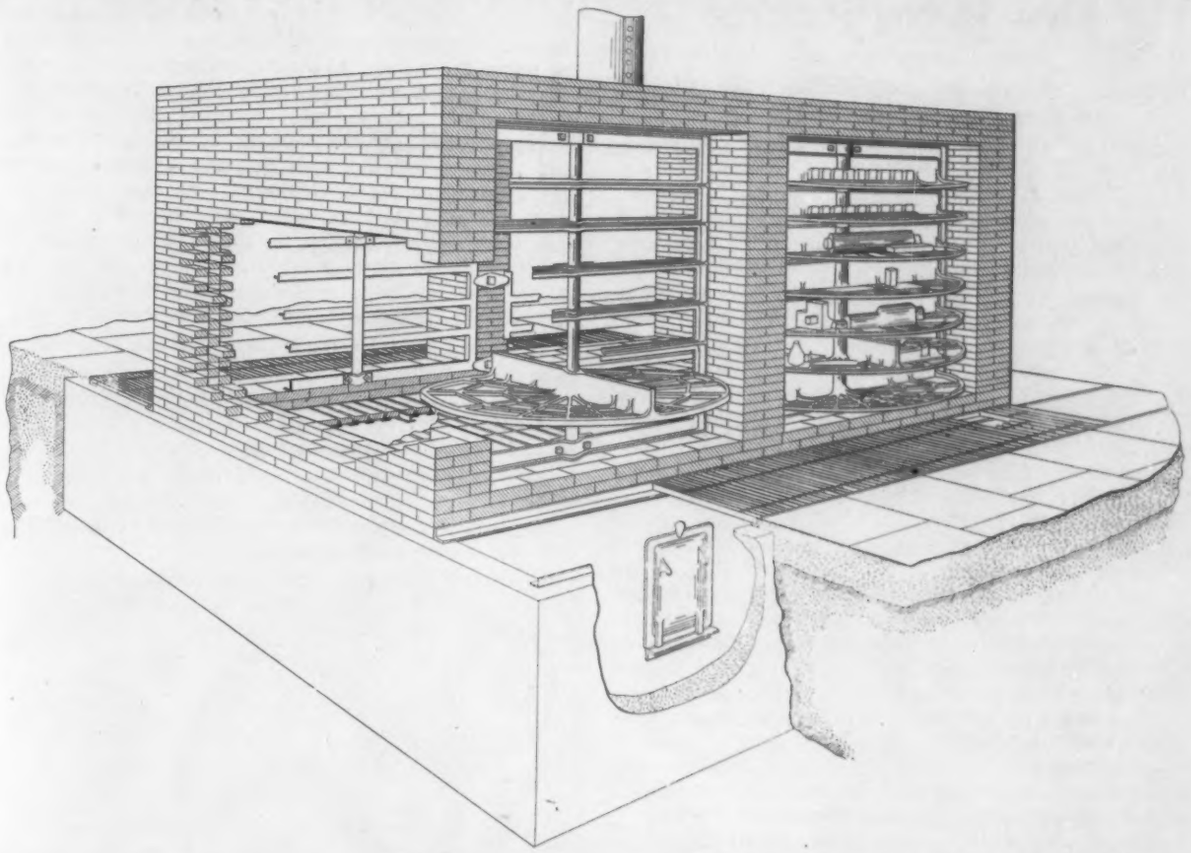


Fig. 9.—Continuous Core Oven, Oil or Gas Fired.

these efficiencies in a form adapted to more general use than any of the other forms upon the market, and without the considerable limitation which has existed with them of requiring a massive foundation.

The E. D. Clapp Mfg. Company's Improvements

The E. D. Clapp Mfg. Company, Auburn, N. Y., one of the pioneer drop-forging concerns of the country, has recently completed a series of comprehensive improvements in accordance with the most modern forging practice. The company's shops are located in the western section of Auburn, on a plot of land sufficiently large to allow for the erection of additional buildings whenever necessary. At present they occupy over 2 acres of floor space.

To insure thorough ventilation and a maximum of light, a new monitor roof has been added to the forge shop, equipped with Lovell window operators furnished by the G. Drouvé Company, Bridgeport, Conn. A number of new, heavy drop hammers, designed and built in the company's shops, have been installed, as well as two new geared Bliss presses for use in connection with the heavier class of forgings. A Pels heavy armor plate bar cutter for heavy round and square stock, supplementing two alligator and one guillotine pattern shears now in use, completes the addition to the forging department. A separate concrete and brick pickling room for removing scale from forgings, a concrete room for dies, large sheds for bar and wire stock and two scrap sheds have also been erected.

Special attention has been devoted to the finishing departments, where a great variety of drilling, tapping, drawing, swaging, threading and milling operations is carried on. New Excelsior swaging machines and thread rollers have been installed, as well as a second Houser freight and passenger elevator.

A General Electric high voltage motor of sufficient capacity to drive the forge shop, and connected with Niagara Falls power, insures continuous operation of the hammers in the event of a breakdown in the company's power plant. Plans are now being made for completely electrifying the plant on the group drive system.

This company, which virtually operates three departments, devoted respectively to the carriage, automobile and general manufacturing trades, is entering on its forty-seventh year with excellent prospects, and under the management of the same family by whom it was founded in 1864, the officers being Delamer E. Clapp, president and general manager; William S. Lee, vice-president and secretary, and E. Donaldson Clapp, treasurer and sales manager.

Unique Drawbridge at Portland, Oregon

One of the most interesting structural projects of the new year is a bridge to be built at Portland, Ore., across the Willamette River. This will be a double deck bridge, the upper deck carrying a highway and street car tracks, while the lower deck carries the tracks of the Harriman railroad lines. The bridge will require 8000 tons of steel, although the length of the structure proper is only 800 ft. A novel feature is in the arrangement of the lift span to permit the passage of shipping. The upper deck is high enough to allow the passage of practically all shipping except full rigged sailing vessels. The lower deck, which carries the railroad tracks, would interfere with shipping to such an extent that the bridge has been designed so that the lower deck will remain raised at all times except when it is lowered for the time necessary to permit the passing of a train. It is raised and lowered without disturbing the upper deck. When a full rigged sailing vessel demands passage, the entire draw span, carrying both the upper and lower decks, will be raised on towers to the necessary hight. By this unique construction the deck which carries the street car tracks and the highway will be raised only at long intervals, thus permitting steady use of the bridge for these purposes. The lift span will have a clear opening of 206 ft.

Belfont Furnace, at Ironton, Ohio, which has been out of blast for repairs since July, will be blown in this week.

Brass Melting Furnaces

Varying Adaptations and Efficiencies of the Five Classes Now in Use

BY W. M. CORSE.*

From my experience with brass melting furnaces, I would say that it is only within the last 10 years that anyone considered seriously any type of furnace except the crucible pit furnace, either coal or coke fired, and operating with natural or forced draft. The direct cause of the interest shown in the various types of brass melting furnaces at present on the market was the introduction of the open flame oil-burning furnace of the Schwartz or Charlier type. The troubles which many brass foundrymen had with these furnaces made them realize that the melting part of their business was not such a simple matter after all. The investigation of the causes of these troubles brought to light many facts which formerly had been passed by as unimportant, or had not been known to the majority of foundrymen.

The wonderful results prophesied for the new types of furnaces led many to believe that much money could be saved by their introduction, and it was not until actual tests had been made over a perior of months that the fallacy of some statements became apparent. Instead of the type of furnace being the panacea for all melting ills, both metallurgical and financial, it was soon found that the same thing held true here as in other branches of manufacture, viz.: that each type of furnace is best adapted for certain kinds of work.

That zinc could be volatilized to the tune of 45 per cent. during the process of melting was a revelation to many founders. The laboratory was brought into play, and through it many valuable data were obtained. The net result of all this discussion and experiment was a large amount of practical information on the melting of brass and bronze, which was paid for by that famous personage known as the "ultimate consumer." Some gentlemen can tell you to-day wonderful stories of how fast profits can be made to disappear into spelter smoke. The industry was, however, immensely benefited by all this, and we find to-day a better knowledge of melting conditions than ever. Of course, there is still a great diversity of opinion, but I think it is pretty generally conceded that our friends, the crucible makers, are not going out of the business, even though their faces were a little long for a while.

The Five Classes of Furnaces and Their Efficiencies

The furnaces in use to-day come under five classes:

1. Stationary crucible furnaces, coke or coal fired, using natural or forced draft.
2. Stationary crucible furnaces, oil fired.
3. Tilting crucible coke furnaces.
4. Tilting crucible oil furnaces.
5. Tilting open flame oil furnaces, without crucibles.

The quality of the metal from Class 1, with natural draft, cannot be excelled if the stack is operating with a good draft. By the latter I mean at least 2 or 3 in. of suction in the main flue, as shown by a water gauge. Many batteries of these furnaces are operating inefficiently because of poor draft conditions. Lack of intensity of draft is a common fault. If the coke consumption is between 25 and 40 lb. per 100 lb. of metal melted, I would consider the practice good, figuring on a red brass melt. Different alloys will vary this somewhat. The difficulty of regulating the temperature of this type of furnace is one of its faults.

Using Professor Richards' figures of 1 lb. of coke for 54 lb. of metal melted as 100 per cent. efficiency, we get $100 \div 54$ or 1.85 lb. of coke per 100 lb. metal melted. This makes the average efficiency of a good battery of coke furnaces $1.85 \div 40 = 4.6$ per cent. to $1.85 \div 25 = 7.4$ per cent.

In Class 2 the quality of the metal depends somewhat on the air pressure used, as well as on the design of the furnace. Generally speaking, the lower the air pressure the better the metal. Low air pressures—that is, below 4 oz.—seem to give metal fully as good as that from the natural draft coke or coal furnaces. Computing the efficiency from Professor Richards' figures again, we find that 1 part of oil will melt 88 parts of metal. As oil generally weighs 7½ lb. to the gal., we find that 1 gal. of oil will melt $7\frac{1}{2} \times 88$, or 660 lb. of metal at 100 per cent. efficiency, or 0.15 gal. to 100 lb. of metal melted. The average oil furnace takes 2.0 to 3.5 gal. to melt 100 lb. of metal, so its efficiency will be between $0.15 \div 3.5 = 4.3$ per cent. to $0.15 \div 2.0 = 7.5$ per cent.

In Class 3 we get a much faster melting time with a coke consumption of 12 to 20 lb. per 100 lb. of metal melted. The efficiency here would be then between $1.85 \div 20 = 9.07$ per cent and $1.85 \div 12 = 15.4$ per cent. We have, however, what is considered by some the disadvantage of double pouring, which may affect the quality of the metal.

In Class 4 we have the same efficiency as in Class 2, with the double pouring factor.

In Class 5 we get the same efficiency as in the other oil furnaces, with the double pouring factor also. Besides we have the danger of excessive oxidation, due to the fact that the flame comes into direct contact with the metal. The speed of melting, however, may offset some of the disadvantages. The ease of handling and the low labor cost of operating are certainly advantages.

Further Gains in Efficiency to Ee Expected

I have tried to state the facts about the various classes of furnaces as I have gained them from my experience, with a view of interesting foundrymen in the study of the subject, and think that the figures are substantially correct for average practice. If any type of furnace excels these average figures, it is certainly worth investigating. In view of the rapid advance in furnace design during the last 10 years, we may expect still more interesting developments in the future, and the purpose of this paper has been accomplished if sufficient interest has been aroused to incite further endeavor along these lines. Such a result can best be accomplished by cooperation between the manufacturer and the user, a policy which I think should be followed wherever practicable.

As the price of fuel varies in the different localities, no attempt has been made to estimate the cost of melting, but with the data given above, one can figure for himself the comparative costs of the different classes of furnaces mentioned, with respect to the fuel item.

* Works manager Lumen Bearing Company, Buffalo, N. Y. Secretary American Brass Founders' Association.

A Municipal Congress and Exposition

An International Municipal Congress and Exposition will be held in Chicago, September 18 to 30, 1911. The announcement of this enterprise states that it is expected to be the world's greatest exploitation of municipal progress. It will cover all matters of interest to all branches of municipal service. On each day of the congress papers will be read and discussed by prominent municipal officers, and the leading municipalities of this country and foreign countries will have attractive exhibits of undertakings in which they excel. Manufacturers of municipal appliances will also have exhibits of an appropriate character.

The exposition will be held in the Coliseum, Armory and Exposition grounds. Edward H. Allen, 1107-1108 Great Northern Building, Chicago, is general manager. John MacVicar has been selected for the position of commissioner general. He has been in active service in municipal work for more than 20 years. Upon the organization of the League of American Municipalities, 15 years ago, he was made president, and has since been actively connected with that organization, serving as secretary for the past 10 years. He is now superintendent of streets and public improvements, Des Moines, Iowa.

MODERN FOUNDRY EQUIPMENT

EXAMPLES OF IMPROVED MACHINERY EMPLOYED IN THE PRODUCTION OF IRON, STEEL AND BRASS CASTINGS

MOLDING AND CORE MACHINES

The Farwell Squeezer Molding Machines

The first molding machine built by the Adams Company, Dubuque, Iowa, was the plain Farwell squeezer. Its design was inspired by the need of an easily operated machine for making light hardware, but in later years squeezers have come to be used on a great variety of work that was originally considered beyond their range. The squeezer, first built in 1897, has since been improved

Fig. 1.—The Farwell Squeezer Molding Machine Made by the Adams Company, Dubuque, Iowa.

by making the bearings self-oiling, providing a chilled sliding block for the crank shaft, having a vertical movement in the slots through the legs, and by attaching a side shelf to take the place of a separate table. Various parts have been strengthened, and the links connecting the rocker shaft with the squeezer top are now made straight.

These machines were first used with gated patterns and sand matches, squeezing the drag on the match and then squeezing the cope on the drag, but in recent years match plates have gained in popularity and many plants are now equipping all patterns in this way, except for jobs to be made in small lots and which will not stand the extra shrinkage caused by casting the aluminum match plate. One movement of the lever brings the squeezer top into position and squeezes the mold, while the lever is in a horizontal position and the molder can rest his weight upon it.

The success of this simple machine led to designing the Farwell automatic molding machine. About 10 years ago this machine gave great promise, and the builder went to considerable expense to develop it, but the high cost of maintenance due to the rapidity with which parts wore out showed conclusively that it could not compete with the plain squeezer in output or cost per mold. The automatic machine must be equipped with a match plate pattern, whereas the squeezer will use any kind, but the match plate gives the maximum output.

The next addition to the company's line was the Farwell Universal molding machine. This squeezes the mold and lifts the mold from the pattern, either with or without a stripping plate. The universal machine can also be used as a plain squeezer with any of the types of patterns adapted for these machines, since the lift table and mechanism are all out of the way, and the main table is the same as on the squeezer. Stripping plate machines are ordinarily used to make only a half mold, and where cope and drag are not identical a separate machine is required to put up the other half, but in the universal machine a cope and drag can be made side by side on the same machine, the drag half of the mold being stripped and the cope lifted off without the use of a stripping plate.

After the universal machine came the Farwell stool plate molding machine. This is designed for more complicated stripping plate work, which must be accurately guided and which calls for stooling. Although it can be operated as an ordinary drop machine, it is best to mount the pattern rigidly upon the machine and raise the stripping plate instead of dropping the pattern, if the mold is to be squeezed. This machine, like the Farwell squeezer and the universal, is made in 30, 34, 38 and 60 in. sizes, either stationary or portable.

Fig. 1 shows the Farwell squeezer as made to-day and equipped with the most approved appliances. The cast aluminum match plate resting against the tool shelf is squeezed between the cope and drag, making a complete mold with one squeeze. The Adams pneumatic rapper, attached below the table and operated by the molder's knee, produces ample vibration for any ordinary work. The real problem in getting a big output from these machines is the pouring of the iron, as a man can easily put up more molds in a day than he can pour off without assistance. For malleable iron and brass foundries the Farwell squeezer is supplied with stationary legs. Another style of these squeezers, for

Fig. 2.—The Heavy Duty Farwell Squeezer.

use where floor space is limited, or metal is poured several times a day, is the wall type or bracket squeezer, described in *The Iron Age* June 2, 1910. A few foundrymen desire to straddle the sand heap with a portable machine and for these a broad gauge type is built. Another type of Farwell squeezer is a low-down portable machine, and if so ordered the stationary machines are built low-down.

The heavy duty Farwell squeezer, Fig. 2, is similar to the low-down portable squeezer, but much heavier,

and the top is counterbalanced by an adjustable spring, making it operate easily. The illustration shows a basket grate in an 18 x 22 in. roll-up flask with irregular parting line. Contrary to common belief match plates are adapted for irregular as well as straight parting lines, and on a job like this are superior to other types of patterns. By using a roll-up flask the pattern can be removed without taking the cope away, thus enabling one man to finish the mold ready to be set on the floor. When the

Fig. 3.—The New 24-In. Farwell Squeezer.

cope is rolled up its weight is supported by the drag, which would break away from the sand but for special provision to support this weight. On the job illustrated the drag has lugs on the inside resting upon the bottom board. If the pattern could not be rolled out of the drag the match plate would be fitted with ears and drawn straight on pins attached to the drag; the cope having no ears to fit these pins could be rolled up, as shown in the engraving.

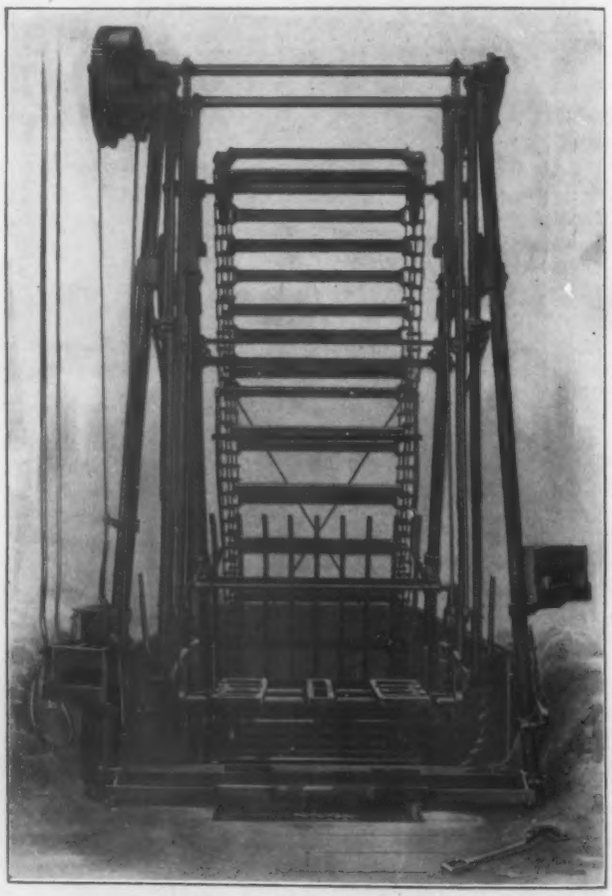
The latest Farwell squeezer is the 24-in. machine shown in Fig. 3. This is a little lower than the regular 30-in. machines, commonly used in malleable foundries, and is designed for light work where rapid operation is important, and floors are not large enough to call for a portable machine. The table is raised higher above the rocker shaft than on the other machines to permit handling a larger flask in proportion to the width of the machine, while the long radius upon which the top swings makes it possible to clear the mold without dropping down far enough to make it hard to pull forward again.

The only Adams machine that can strictly be classed as a roll-over machine is the Farwell pneumatic, described in *The Iron Age* May 5, 1910. This is recommended only for work that cannot be made by the match plate method on squeezers, as any roll-over or stripping plate machine makes only a half mold at a time, whereas a squeezer with a match plate pattern makes a complete mold. The Farwell squeezer can be equipped with a match plate pattern in a roll-up flask, with pins on the drag to guide the pattern instead of rolling it out. Lugs inside of the drag rest upon the bottom board and support the weight of the cope. It is easier to roll up the cope and roll it back into position again than to lift it off and place it on the side shelf while the pattern is drawn and then pick it up and replace it, so this method has decided advantages where it can be used. Squeezer jobs that cannot be rolled up on account of practically straight draft, such as wheels, gear blanks, pulleys, &c., are sometimes made on stripping plate or drop machines, similar to the Farwell stool plate machine, but only a half mold can be made at a time, and when both cope and drag are made from the same half pattern any error in placing the pattern or fitting the pins is doubled in the casting. Therefore, such work should be done on match plates whenever possible. To get good results the flask pins and ears must be accurately fitted and the match plate provided with adjustable V-blocks on the ears, milled to fit the flask pins. This guiding of the pattern while it is drawn is another advantage of match plate molding, and makes possible more uniform castings than when a loose pattern is rapped with a bar.

The Adams Company builds 72 styles and sizes of molding machines, but the plain squeezer herein principally referred to has the largest field. It is desirable to provide facilities for handling the iron, as a man on a squeezer can usually put up more molds than he is able to pour. If trolleys will enable the man to pour his own floor, better results are obtained than when he is given help not familiar with the molds to be poured.

The Buch Gravity Molding Machine

The gravity molding machine built by the A. Buch's Sons Company, Elizabethtown, Pa., is based on the fact that after packing or compressing sand into bodies of the proper size and shape such bodies can be uniformly packed into the flask to any degree of firmness desired by dropping them a comparatively short distance. It was found after much experimenting that a drop of 11 ft. was ample for any class of work. Further experiments, how-



The Gravity Molding Machine Built by the A. Buch's Sons Company, Elizabethtown, Pa.

ever, demonstrated that to practice such a method successfully it was necessary to accomplish the following:

1. To compress or pack the sand into bodies or strips as long or longer than the width of the flask, but of such thickness that a series of such bodies are required to fill a flask.

2. To provide controllable means for automatically compressing the bodies or strips of sand to the degree of firmness necessary.

3. To provide a practical mechanism for elevating and for discharging the bodies of sand from a sufficient hight to cause them to pack uniformly together around the patterns in the flask.

4. To provide suitable means for moving the flask back and forth across the line of fall of the bodies of sand to

cause them to be discharged into the flask in their proper relation to each other so as to ram up the mold uniformly throughout.

The Buch gravity molder automatically riddles the sand and compresses it into properly shaped bodies; the flasks are automatically filled with a series of these compressed unitary bodies of sand, and the same operation which automatically fills the flask simultaneously rams up the mold uniformly throughout, regardless of the depth of the flask or the size and shape of the patterns. It strikes off the surplus sand from the top of the filled flask, and it automatically draws the pattern perfectly straight from the mold without the aid of stripping plates and without breaking down the sand on the most intricate or difficult work, except gears, on which the use of stripping plates is advocated.

In operating the machine, the sand is ordinarily tempered at night and placed in two large heaps, one on each side of the machine. When the machine is started, a roller feeder at the bottom of the hopper feeds the sand in an even stream from the hopper to the elevator, and it is carried by the buckets of the elevator and discharged at the top into the flask below, which is supported on a swinging cradle. While it is being elevated, each bucketful of sand is engaged by a compressor which automatically compresses or packs the sand in the buckets. The pressure exerted by this compressor can be instantly adjusted so as to pack the sand in the buckets to any degree of firmness desired, by which means the molds can be made hard, soft or medium, as may be required. The flasks are rammed up by a succession of compressed bodies or strips of sand falling beside each other until a layer is formed across the entire area of the flask, after which additional layers are built up in the same manner until the entire mold is formed of some solid mass of sand of the same degree of firmness throughout. As these bodies of sand are discharged very rapidly, but a few moment's time is required to ram up a large sized flask.

These machines are used for making a general line of castings. Letters from foundrymen are published by the company, which show that castings are being satisfactorily made weighing up to 1500 lbs. each. Quite difficult castings are mentioned by them as being successfully molded.

The hight of the machine is 14 ft. 10¾ in. above the floor, and it extends 5 ft. 6 in. below the floor. The No. 2 machine has a total width of 9 ft. and weighs 12,000 lb.; the No. 3, a width of 11 ft. and a weight of 15,000 lb.; the No. 4, a width of 13 ft. and a weight of 20,000 lb.

Osborn Molding Machines

A new molding machine for turning out green sand drags and dry sand cores, made by the Osborn Mfg. Company, Cleveland, Ohio, was first introduced at the National Foundrymen's convention at Detroit last summer, where it attracted considerable attention. Since then it has demonstrated its practical advantages in a large class of actual foundry work, particularly in the turning out of automobile castings, such as crank cases, gear cases, &c., and for a large variety of castings for electrical work.

The construction of the machine is simple, as may be seen from Fig. 1. It consists of a rigid skeleton framework, a frame for holding the flask and pattern, and the drawing table, which is pivoted at one side so as to swing in below the flask, or out again at right angles to the machine. This table has an automatic leveling device, which instantly accommodates itself to any unevenness of bottom boards or drier plates. The drawing mechanism is simple. A half-turn of the crank gives the full draft of 7½ in.

After the flask or pattern is attached to the frame and rammed, and the bottom board or drier plate clamped in position, the frame is rolled over on its horizontal axis by hand, the drawing table swung into position, and the clamps removed. A half-turn of the crank draws the mold, which is then swung out free from the machine, ready to be lifted off. After the complete mold is drawn the table can be swung back into position, and the machine will print back with infallible certainty. One man, not necessarily a skilled molder, will easily turn out two or three times as much work with the machine as two skilled molders can working on the floor, and the quality of the work is superior and the accuracy of the draw means a large increase in the percentage of good castings.

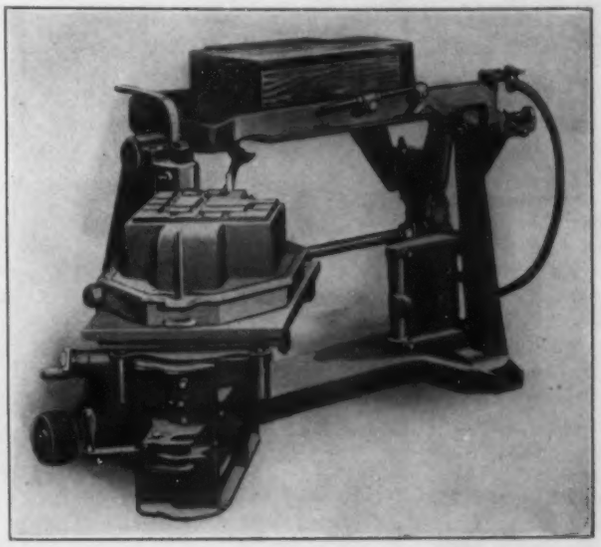


Fig. 1.—The Direct Draw Roll-Over Molding Machine Built by the Osborn Mfg. Company, Cleveland, Ohio.

The Osborn No-Shock jolt machine involves a new principle. As may be seen from Fig. 2, the shock is absorbed by a massive cast iron bedplate or anvil; the one illustrated weighs about 6 tons, while the jolt itself is of a size to ram molds up to about 7500 lb. A set of large springs below the anvil effectually prevents any transmission of shock to the soil, and an upper set prevents the rebound which tends to jar the sand loose in the mold and interferes with the process of ramming.

The only foundation necessary is a few inches of concrete to which the heavy oak frame supporting the

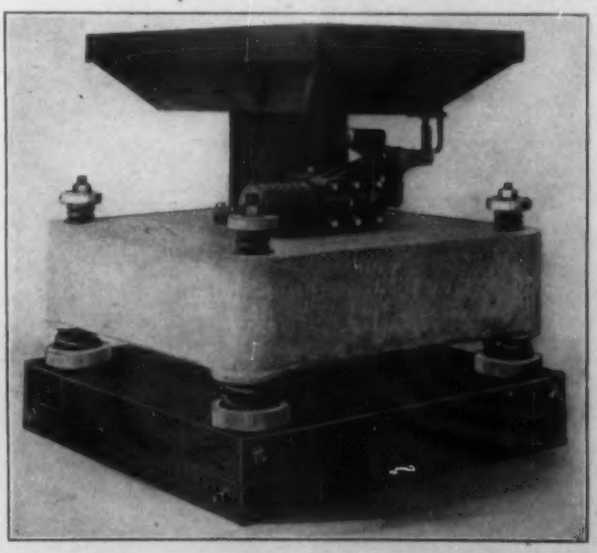


Fig. 2.—The Osborn No Shock Jolt Molding Machine.

anvil is bolted. Even in the most unfavorable soils this will prove ample, as has been demonstrated in a foundry in Cleveland, where the ground wave was not perceptible to one standing close by the machine, although it could be distinctly felt from a much smaller machine of another type 60 or 70 ft. distant. This latter machine was ramming a mold that was, approximately, 200 lb., while the Osborn No-Shock machine was carrying a load of nearly 4 tons. Very large and deep foundations are generally necessary, sometimes many feet square and several yards deep, and then often the ground wave is not eliminated.

The heavy ribbed table, large cylinders and jolting

mechanism are the same as in the Osborn plain jolt molding machine. All of its advantages are retained, including perfect regulation of the length of stroke and force of blow, with any air pressure sufficient to operate the machine.

Edward A. Pridmore Molding Machines

Two of the most popular molding machines manufactured by the Edward A. Pridmore Company, Chicago, Ill., are shown in Figs. 1 and 2. The second is the type T stripping plate design, and is made in 14 different sizes. They are so constructed that each size is adapted for use with a large variety of flasks. The draw of the machine, which at its maximum is 5½ in., can be instantly adjusted to the amount required for the pattern to be molded. The yoke which carries the pattern travels in one set each of upper and lower adjustable guide ways, this construction insuring an absolutely true pattern draw. The machine is very low to facilitate ramming, and is substantial and rigid, the upper and lower frames to which both sets of ways are attached being cast in one. These machines, fitted for molding street car brake shoes, have the parting of the pattern on the curve of the shoe, formed by building parting pieces up on one of the stripping plates and making corresponding recesses or depressions on the other plate. This is much quicker and cheaper than making curved stripping plates to conform with the parting line of the pattern. The necessity of using a cut flask is also obviated.

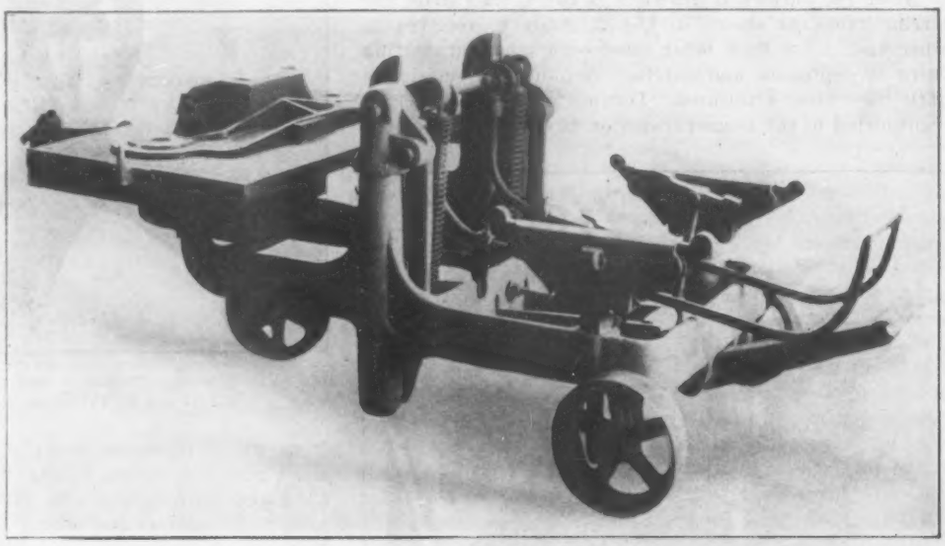


Fig. 1.—The Type R Edward A. Pridmore Turn-Over Machine with 14-in. Draw.

The machine illustrated in Fig. 1 is of the turn-over draw design, known as type R. The machine is shown fitted with the pattern ready for the flask to be set on. The mold is rammed up and clamped with the bottom board to the pattern carrying frame, after which it is turned over on the receiving device ready for the pattern to be drawn. Machines of this design are made to be operated by hand or power, depending upon the size of the work to be molded. One of the great advantages is that there is practically no limit to the amount of pattern draw which can be secured. Stock sizes are made with draws of from 6 to 14 in. The pattern carrying frame operates on parallel uprights, which are set and finished accurately to insure an absolutely true and even pattern draw. Adjustable counterbalancing devices operate automatically in conjunction with all working parts, so that the heaviest mold can be turned over and the pattern withdrawn from the mold with facility. The flask receiving device is unique in that it is adjustable in every direction. The flask rods are fitted with adjustable screws, so that flasks of various depths can be used on the same machine without blocking up. All working parts are away from the sand and are carefully protected from dust. Several sizes of these machines have been designed especially for molding cores.

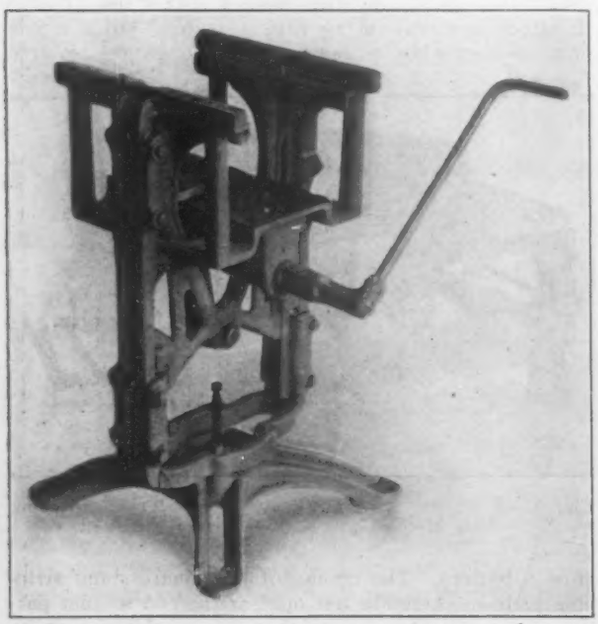


Fig. 2.—The Type T Molding Machine Built by the Edward A. Pridmore Company, Chicago, Ill.

The New Tabor Jarring and Roll-Over Molding Machine

In one of its latest products the Tabor Mfg. Company, Philadelphia, Pa., has combined a 6-in. shockless jarring machine and a 30-in. roll-over machine. The pattern drawing cylinder gives a straight draft of 12 in. In Fig. 1 a flask is shown clamped to the pattern plate

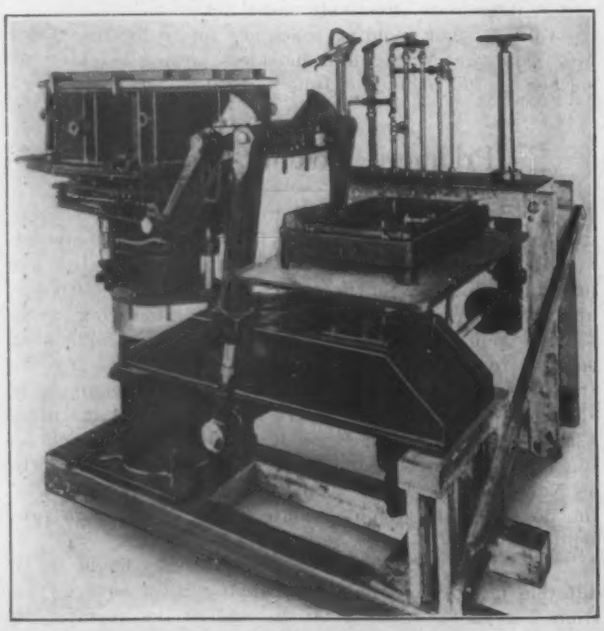


Fig. 1.—The Combination Jarring and Roll-Over Molding Machine Made by the Tabor Mfg. Company, Philadelphia, Pa.

and resting on the jarring table with the bottom board secured preparatory to rolling over. This is accomplished by admitting compressed air to the roll-over cylinder, whereupon the arms of the hinged frame come in contact with the pattern plate lifting the flask clear of the table before it begins to roll over. An eccentric on the trunnion shaft actuates locking bolts, which secure the pattern plate to the hinged frame and hold it firmly when inverted. Finally the flask is lowered upon the receiving table, which adjusts itself to the inequalities of the bottom board, and the clamps are removed from the pattern plate permitting the pattern to be drawn. The receiving table is adjusted vertically for different depths of flask by the hand wheel shown in the upper right corner of the illustration.

After the pattern is drawn it is rolled back upon the jarring table, as shown in Fig. 2, ready to receive another flask. The flask being filled with sand the starting valve is depressed and jarring continues automatically until the valve is released. During jarring no shock is transmitted to the hinged frame or any other part of the

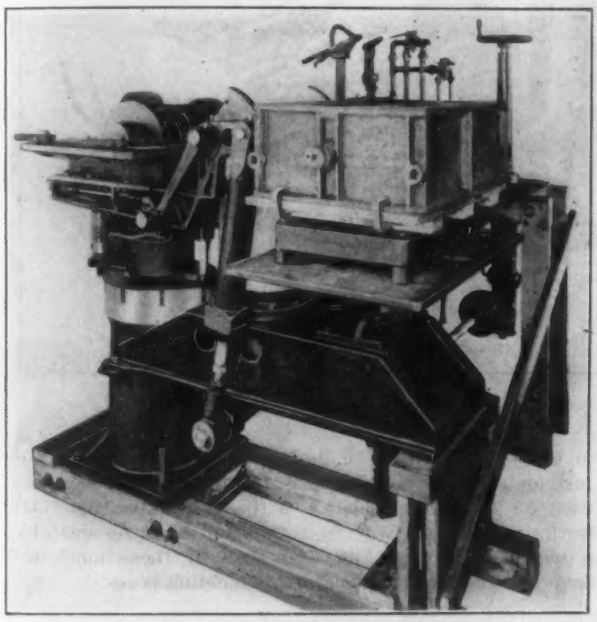


Fig. 2.—The Machine with the Flask Rolled Over and the Pattern Drawn and Rolled Back.

machine, except the jarring table and its anvil. The latch lever at the left of the controlling devices in the illustrations regulates the stroke, which can be varied while the mold is being rammed from 1 to 4 in. A few short strokes at the start liberate the entrained air in the sand, and with a longer stroke the remainder of the work can be done more effectively and quicker.

Among other molding machines made by the Tabor Mfg. Company is the plain shockless jarring machine described in *The Iron Age* June 9, 1910.

Pridmore Molding Machines

A very large variety and range of sizes of molding machines are built by Henry E. Pridmore, Nineteenth and Rockwell streets, Chicago, Ill. In the entire line are machines suitable for practically all foundry purposes, and a number are specially adapted for producing molds for automobile castings. Among them three have been selected for mention in the present article, including the tripod stripping plate machine, of which an example is shown in Fig. 1, double shaft stripping plate machine, Fig. 2, and the rockover molding machine, of which no illustration is given, since several appeared as recently as November 10, 1910. A more complete description of the double shaft stripping plate machine was also presented in *The Iron Age*, September 1, 1910.

The tripod stripping plate machines are made in 17 different designs and 450 sizes, ranging in the square type from 7 x 12 in. to 58 x 90 in., and in the round type

Fig. 1.—A Round Tripod Stripping Plate Machine Built by Henry E. Pridmore, Chicago, Ill.

from 10 in. diameter to 64 in. diameter. The double shaft machine, shown in Fig. 2, has mounted upon it a 52-in. gear pattern, and will accommodate round flasks up to 6 ft. diameter and square flasks up to 5 x 12 ft. The rockover machines are made in sizes from 14 x 12 x 8 in. up to 20 x 24 x 12 in. The Pridmore rockover drop machines are also used extensively for molding cores of various sizes and shapes. An illustrated description of the machine adapted to this use was given in *The Iron Age* July 7, 1910. Both the rockover drop and the stripping plate machines are also built with power ramming attachments.

Frequently the number of castings required for certain patterns is not sufficient to necessitate separate machines for those patterns, and in such instances one machine suitable in size and type for molding several different jobs is selected. When the rockover drop machine is used it is very simple, and requires only a few minutes to attach and remove the pattern plates. Often a machine is used when as few as five castings are required

Fig. 2.—A Square Pridmore Heavy Double Shaft Stripping Plate Machine with a 52-In. Gear Pattern.

from a pattern. The frames of the square stand stripping plate machine are left open at the end so that patterns several inches longer than the machines may be used. The single and double stand rockover machines differ from the rockover drop design mainly in that they have no pattern drawing mechanism, consequently all patterns fitted to them must have sufficient draft to be rocked over without breaking the mold. The rockover

drop machines are fitted with automatically adjustable self-locking flask rests, the hight of which can be regulated to the depth of flask to be used. The operation of rocking over is facilitated by balance springs, which are capable of rapid adjustment. Adjustable clamping rods are used to clamp the bottom board and flask to the rock-over frame, rather than loose clamps, not only to save time, but because after the flask is rocked over and the rod released all parts of the mold are freed at the same time.

The Acme Core Machine

A core machine of the type which forces sand through dies by means of revolving screws or reciprocating plungers, produces what are known as stock cores. Such cores are of uniform cross section, but can be of any form that will go through a die. Screw machines are more limited than plunger machines in this respect, as the screw tends to feed a cylindrical body of sand, while with the other machines, by properly forming the plunger, any irregular shape may be made.

Fig. 1.—The Three-Die Plunger Type Core Machine Made by the Acme Core Machine Company, Cuyahoga Falls, Ohio.

For many years the objection to plunger machines was that the reciprocating plunger tended to form partings in the core and thus weaken it. F. C. Francisco, who developed the machine made by the Acme Core Machine Company, Cuyahoga Falls, Ohio, adopted the plunger type on account of its greater range in form of dies, and also the greater latitude in the nature of mixtures used. The general form of the Acme core machine is shown in Fig. 1, this being one of the three-die machines. For making the larger cores a single die is used, together with a single plunger, while for the smaller cores multiple dies are resorted to, the tubes being so spaced that they feed the cores on to the corrugated core pans, so that each core lies in the center of one of the corrugations. To overcome the objection of the plunger forming partings in the core Mr. Francisco patented a form of plunger with a cupped face, as shown in Fig. 2, which represents a section of the face of the plunger. The vent rod passes through the central opening *a*. The face of the plunger proper is recessed, as shown at *b*, so as to form a cup at the end. The sand has a tendency to pack in this cup, forming a sand face on the end of the plunger, which becomes thoroughly attached to the plunger, advancing and receding with it. This in effect gives the plunger an irregular sand ramming face, as shown by the dotted line *c*. The result is that there is no parting line in the core, extensive experiments having failed to reveal any such weakness.

The plungers for feeding the sand through the dies are attached to a reciprocating crosshead back of the sand hopper, and the vent wires pass through the centers of the plungers and are attached to a stationary yoke back of the crosshead, as shown in Fig. 1. The crosshead carries a rack bar which engages a pinion on the side of the sand hopper, and this in turn operates a sand feed that insures a regular supply of sand in front of the plungers. By varying the position of the plungers forward or back the amount of packing can be regulated and the machine adjusted to work mixtures which vary greatly. This makes it possible to work any ordinary bench mixture in the core machine. It is also possible to use mixtures that contain no oil. It is necessary, however, to oil the core pans to prevent the cores from sticking when baked.

Another advantage which the plunger machine possesses is that it is possible to make exceedingly small cores with the core machine by properly arranging the dies and plungers. The rate of feed of a core through the die depends upon its diameter, the smaller the die the smaller the feed, but the output of the machine depends both on the rate of feed and the number of dies, and hence in case of small cores where a large number of small dies are used the total output is very great, the increased number of dies more than compensating for the smaller feed of the mixture. The wear on the dies of a core machine when the adjustments are properly made is exceedingly slight, and in a plunger machine it is almost imperceptible. The plungers are made smaller in diameter than the dies, and, as already stated, the face of the plunger is in effect a sand face, hence there is practically no wear on the plungers. As a consequence the parts of the plunger machine do not grind out, but will last almost indefinitely.

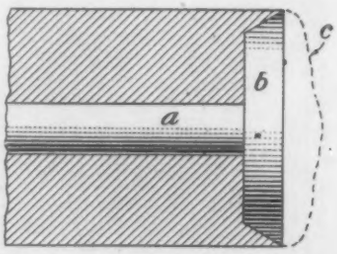


Fig. 2.—Detail of the End of the Plunger.

Arcade Molding Machines

After nearly five years experimenting in its own works, the Arcade Mfg. Company, Freeport, Ill., has introduced its automatic molding machine. It is capable of turning out from 50 to 100 molds an hour, depending upon the class of work, and is especially adapted for shallow work, such as valves and fittings. The castings are very exact duplicates, which means a considerable saving by avoiding overweight. One of the machines is shown in Fig. 1. Its dimensions are hight, 13 ft.; width, 4½ ft., and extreme length, including one section of trough, 18 ft. Each additional section of trough adds 8 ft. The total weight is about 3800 lb.

Patterns are handled on the machine similarly as on the company's Modern molding machine. Split patterns are used, and both halves of the mold are formed at the same time. The sand is fed into the hopper by a belt conveyor, which is in turn supplied by a reciprocating drag conveyor working in a trough extending to any required distance along the floor. The sand is delivered into the hopper through a special screen, and a chute carries off the lumps and foreign matter. When the pattern plates are attached the table is turned face up and the two halves of the flask are placed in position. Pulling a lever causes the sand to drop from the hopper about 3 ft. into the flasks, which assists in tucking the sand into place. Another lever brings a cut-off into ac-

tion which carries the surplus sand into the conveyor. The cope board and bottom boards are then put in their positions, and the flask rolled over and squeezed. When the proper density is reached the pneumatic vibrator starts automatically and continues until the patterns are

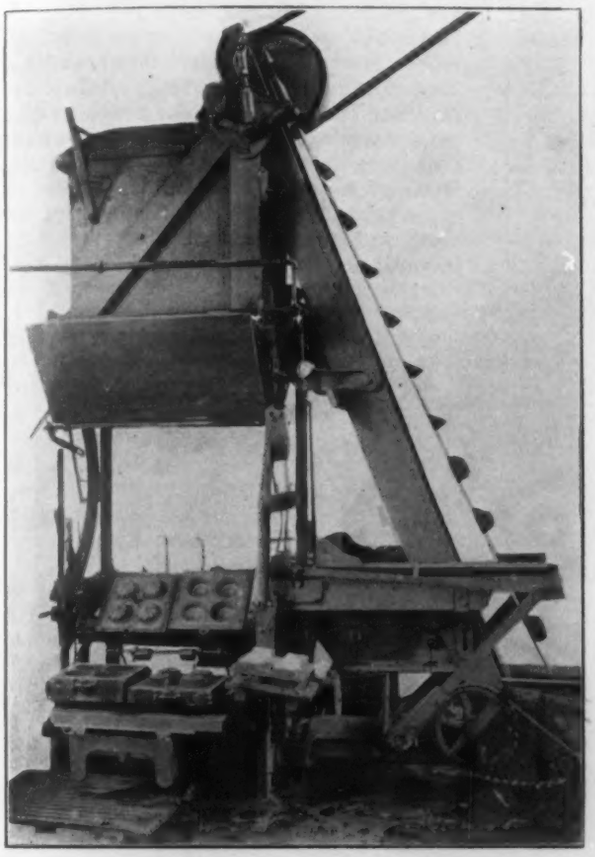


Fig. 1.—The Automatic Power Molding Machine Built by the Arcade Mfg. Company, Freeport, Ill.

free of the molds. The table on which the completed molds rest runs out automatically, so that the operator can close the mold easily. It is then carried away by a helper, who also keeps the drag conveyor supplied with sand. Most of the machine's movements are operated by compressed air, which gives rapidity and flexibility, and enables the parts to be protected from the sand.

Fig. 2 shows a new Arcade core jolting machine, which is designed for handling very large cores. It has a capacity of approximately 1500 lb., and has been tested successfully in plants making such large cores. The machine weighs about 1100 lb., and is operated by an 8-in. pneumatic cylinder, usually under 80 lb. pressure. This gives a lifting capacity of about 1250 lb. The table is 24 x 30 in. The machine is designed to be used as a part of the bench in the coreroom, although a concrete

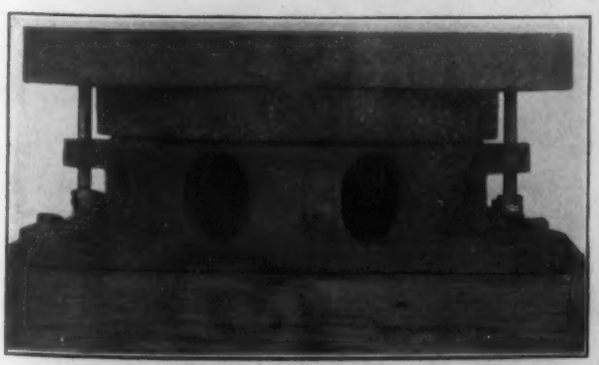


Fig. 2.—A New Arcade Core Jolting Machine.

foundation will give the best results. It will ram the core very rapidly and thoroughly, and in tests made of it the cores were found to be exceptionally accurate.

The Arcade Mfg. Company, in addition to these new machines, has a number of other types of molding machines, among which a comparatively new one is the Norcross three-cylinder jolting machine, which was described in *The Iron Age* October 20, 1910. One recently built for the General Electric Company has 27½-in. cylinders, and a lifting capacity of at least 75,000 lb.

The Elmira Roll-Over Core Machine

Original features in connection with the new power ramming roll-over core molding machine, built by the Elmira Foundry Company, Elmira, N. Y., are the devices for venting and pasting the cores. As shown in Fig. 1 the ramming cylinder is above the platen. The core box or boxes, if two halves are made at once, are fastened to boards having hook cleats on the bottom by which they are quickly secured to the cradle by a special clamping device. The machine can be set up for different core boxes very quickly, and the board K with tucking blocks corresponding to them can also be very quickly interchanged, being secured with wing nuts. The machine has very long draft to handle very deep cores rapidly and accurately, and is capable of turning out intricate or difficult core work better than is possible by hand.

When the empty box is in the position shown in Fig. 1 the ramming head is swung back, as in Fig. 2, and the box filled with sand. The head is then drawn over and air admitted into the cylinder to ram the sand. When the air is exhausted the plunger is returned by springs. Usually after the first squeeze two or more blows are struck by sharp admissions of air to better compact the sand, and the tucking blocks on the board K insure uniform density. With the head again swung back the mold

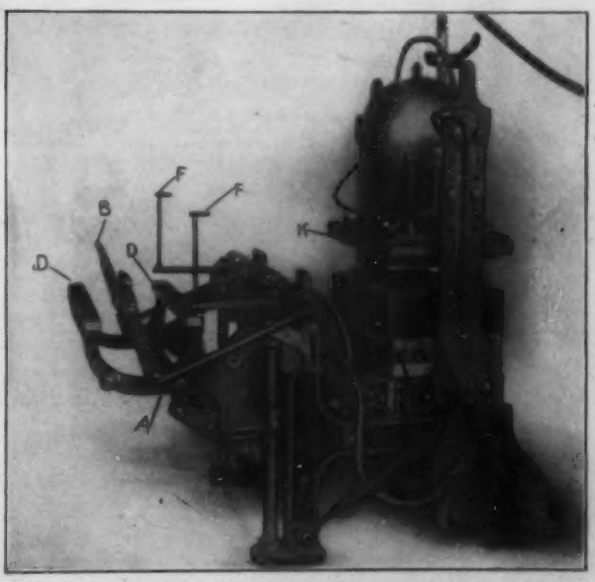


Fig. 1.—The Power-Ramming Roll-Over Core Machine Built by the Elmira Foundry Company, Elmira, N. Y.

is struck off and a special venting rig applied. This consists of a plate with guide pins engaging the box to properly locate the vents, and strips and points erected on the plate to form the vents when squeezed into the mold.

The core plate is next placed in position on top of the mold and secured to it by swinging over the clamping bail A, so that the hooks B engage the latches C. The cradle is then rolled over to the position shown in Fig. 2, where projections E connected to the latches C encounter the posts F and release the clamping bail, which drops down as in Fig. 2. This automatically starts the vibrator G, and by depressing a foot treadle the table is lowered drawing the cores from the bottom. This table and the cradle have counterbalancing springs to facilitate their movement. The cores are left resting on the core plate on the supports D, Fig. 1, and the box returned to its first position to repeat the operation. Adjustments

are provided throughout for different sizes and shapes of core boxes.

The pasting device consists of a wooden box, through the bottom of which is cut the form of the paste strip. This box floats on about 1½ in. of paste in a tank, and the core is laid in the box and guided to position by lugs in the bottom. When the box is pressed down into the paste just enough rises through the opening and adheres to the parting side of the core. Usually it is sufficient to paste only one-half of the core, the other being secured to it when laid upon it. This means of applying the paste is quicker than a brush, wastes no paste and cannot accidentally fill the vents.

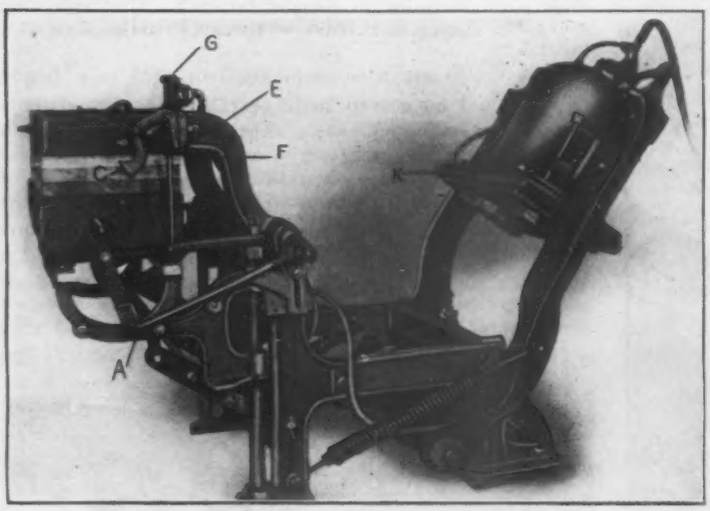


Fig. 2.—The Machine with the Ramming Head Swung Back and the Cradle Rolled Over.

The machine is the joint development of John Gow of the General Electric Company and A. M. Loudon of the Elmira Foundry Company.

HANDLING EQUIPMENT

The Pawling & Harnischfeger Foundry Grab Bucket

A grab bucket designed especially for foundry service, used for handling sand to and from the pile and for cleaning up the floor, is built by the Pawling & Harnischfeger Company, Milwaukee, Wis. The bucket can be used upon the hook of any crane of sufficient capacity, no special hoisting apparatus being necessary. It is manipulated entirely by the crane and the single tripping line, and may be attached to or removed from the crane book in an instant, with no more trouble than the ordinary load, leaving the crane free for other work.

Fig. 1 shows the bucket lowered, ready to pick up its load. The bucket is carried on two wire ropes which are deadened in a equalizer fixed to the framework. From the point of fastening the ropes lead downward around the pulleys in the block and then up again, terminating in a heavy cast steel bail, which is placed over the crane hook. When the crane hoists, with the bucket in the position shown in Fig. 1, the main bucket pivot moves upward, relative to the fixed framework carrying the springs, and the jaws of the bucket close of their own weight, with the load. A linkwork causes the block to move up in practically a straight line.

As the bucket is lifted it assumes the position shown in Fig. 2. In this position it, with its load, may be raised or lowered or carried about from place to place by the crane. To empty the load the line attached to the tripping lever, seen at the right in the engravings, is pulled, thus disengaging a hook which connects the main bucket pivot to the block, allowing the pivot center to descend and the bucket to open into the position shown in Fig. 3, discharging the load. In this position the empty bucket may be carried about, raised, lowered, &c., by manipulating the crane.

When the bucket is lowered to the ground, as soon as the lips strike, the stress on the block is relieved, and as the crane tackle continues to descend the block descends, describing an arc until the hook on the under side of the block again catches the main pivot center which restores the mechanism to the position shown in Fig. 1. Heavy chains seen in Figs. 1 and 3 limit the opening of the jaws and are connected at the top to spiral springs which absorb the slight shock incidental to opening the bucket.

The capacity of the bucket illustrated is 1½ cu. yd. Empty it weighs about 2 tons, loaded about 4 tons. When the bucket is spread open it covers a floor space 6 x 6 ft. The bucket will work in considerably less headroom than the ordinary type of grab bucket and is of very durable construction throughout.

The Pawling & Harnischfeger Company also builds a complete line of cranes and hoists for all classes of service. The cranes used in foundries are the electric travel-

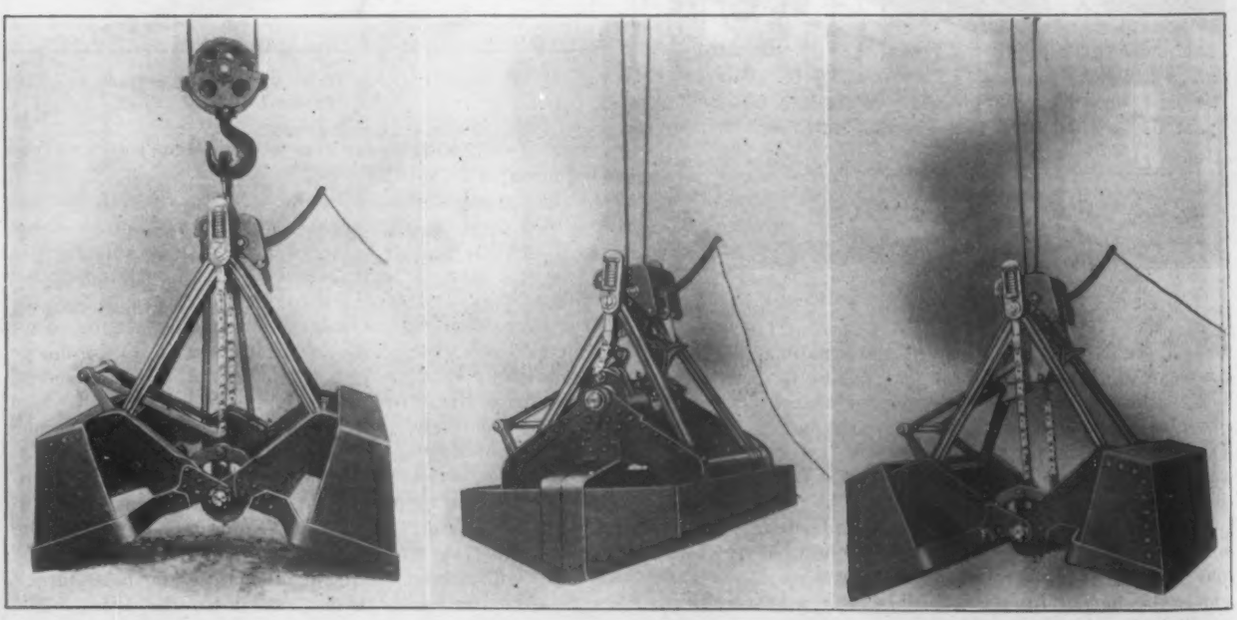


Fig. 1.—Loading. Fig. 2.—Carrying. Fig. 3.—Dumping.

A Foundry Grab Bucket Made by the Pawling & Harnischfeger Company, Milwaukee, Wis.

ing bridge and cantilever wall types and over foundry yards, traveling bridge and one and two leg gantry cranes. Electric trolley hoists are used for handling flasks, patterns, castings, &c., from and to the molding floor.

Alliance Foundry Cranes

In the extensive line of cranes and other machinery built by the Alliance Machine Company, Alliance, Ohio, for use in the iron and steel industries, are the two types herewith illustrated as typical for their classes of foun-

Fig. 1.—A Single-Leg Gantry Foundry Stockyard Crane Built by the Alliance Machine Company, Alliance, Ohio.

dry service. Fig. 1 shows a single leg gantry crane for the stock yards of foundries. An advantage inherent in the type is that it does not require the erection of runways, if it is provided for when the building is erected. It happens that the installation shown was made in connection with an old building. Ordinarily the inner run-

Fig. 2.—An Alliance Wall Crane Installed in a Foundry.

way is secured to the frame of the building. The outer runway for the single gantry leg is merely a rail laid on ties in the ground, as for any gantry crane. The cranes are also made with a cantilever extension, so as to unload and load material from cars on tracks outside the gantry leg. The construction of the crane itself is standard throughout.

Fig. 2 shows a wall crane the important advantage of which in a foundry is that it can be used on individual jobs which require the service of a crane for a considerable length of time, leaving the overhead cranes free for general transporting work up and down the shop for which they are particularly adapted. Wall cranes are built also with a swinging jib, so that the jib can be swung back against the wall when not in use.

Curtis Air Hoists

Through its success in controlling the action of air cylinders the Curtis & Co. Mfg. Company, St. Louis, Mo., has rendered available an inexpensive power capable of wide application in the field of hoisting. The regulators and air cushions used make of the air cylinder a reliable straight line motor.

The Curtis air hoist is manufactured in two classes, pendant and horizontal, with several types and a number of sizes in each class. There are the single and double acting in the straight air or class A type, and the G or balanced pressure type. The illustrations are of rope geared hoists where considerable hook travel is required in comparatively low head room. Fig. 1 shows stationary hoist with single hoisting rope, and Fig. 2 a traveling hoist with two hoisting ropes. Being of all steel construction the hoists are considerably stronger and lighter than the average cast iron hoist. For a given capacity the steel hoist, being lighter, there is less

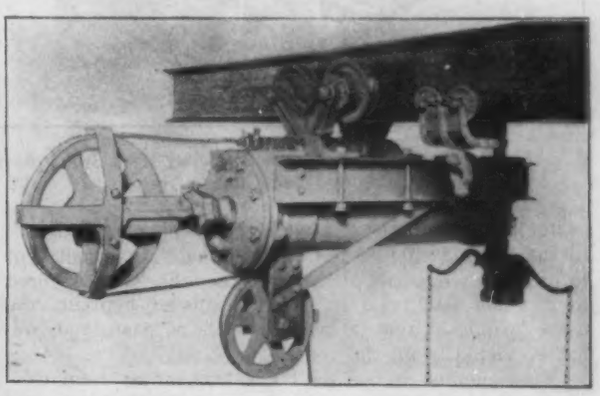


Fig. 1.—A Class E Double-Acting Rope-Geared Air Hoist Made by the Curtis & Co. Mfg. Company, St. Louis, Mo.

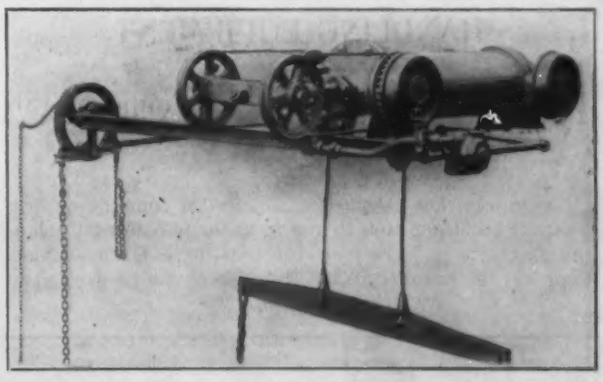


Fig. 2.—A Class L Curtis Hoist Mounted on a Hand-Propelled Trolley.

weight suspended from the trolley, and the load can be moved with greater ease.

The pneumatic hoist in the straight air class is used for ordinary hoisting where delicacy of control is not required, but the air balanced type is adaptable for use where the most delicate hoisting is required; it will not jump or jerk, and can be used for such work in foundry practice as drawing patterns, closing molds, setting cores, pouring molten metal, &c. It is fitted with an automatic safety device that prevents the load from dropping should the air hose break or the air supply fail, and it will hold its load positively at any point of the stroke whether hoisting or lowering.

In these hoists the upper head and lower ring are screwed to the cylinder, and should it be necessary to remove the piston, all that is required is to unbolt the lower head from the lower ring, when the piston can be withdrawn without having to dismantle the hoist, break a pipe connection or even take down the hoist. The operating valve has an equalizing spring, which returns it to neutral position immediately upon the hand chains being released, thus effectively holding the load. By this arrangement only [illegible] hand only to op-

erate the hoist, leaving the other free to direct the load.

Other products of the Curtis & Co. Mfg. Company of interest to foundrymen are air compressors, sand blasts, pneumatic elevators and pneumatic bridge cranes.

Atlas Foundry Cars

A new design of industrial locomotive that is expected to meet with much favor for handling castings is now being brought out by the Atlas Car & Mfg. Company, Cleveland, Ohio. This is a storage battery locomotive equipped with a crane, as shown in Fig. 1. The capacity of the car is 8 tons, and the crane has a capacity of 2 tons. The crane is mounted on a simple truck consisting of a steel frame, well braced, carried on four wheels, the journals of which run in roller bearings. The motor is spring suspended from the frame at one end and connected to the driving axle by reducing gears. A spring suspended angle iron cradle carries the battery trays.

At the operating end of the truck are the controller, brake, charging receptacle, cut-off switch and voltameter. A step and draw bar head are provided at each end. All of the machinery is below the top of the frame and is covered by a heavy wooden deck for carrying the load which is made in removable sections, to give access to the parts beneath.

The crane is electrically operated by the motor shown, and is under perfect control. All of the gears are steel. The swivel operates on roller bearings, making it easy to rotate the crane by hand with its maximum load.

The crane is equipped with a band brake. The principal dimensions of the crane locomotive are as follows:

Width over all, feet and inches	3 6
Length over all, feet and inches	12 7
Capacity of car, tons	8
Capacity of crane, tons	2
Deck dimensions clear of crane, feet and inches	3 4 x 6 4
Wheel base, feet and inches	3 9
Speed of car without load, forward and reverse, on level, feet per minute	125, 250, 375, 500
Speed of car, forward and reverse, on level, with 8-ton deck load, feet per minute	75, 150, 225, 300
Track gauge, inches	21½

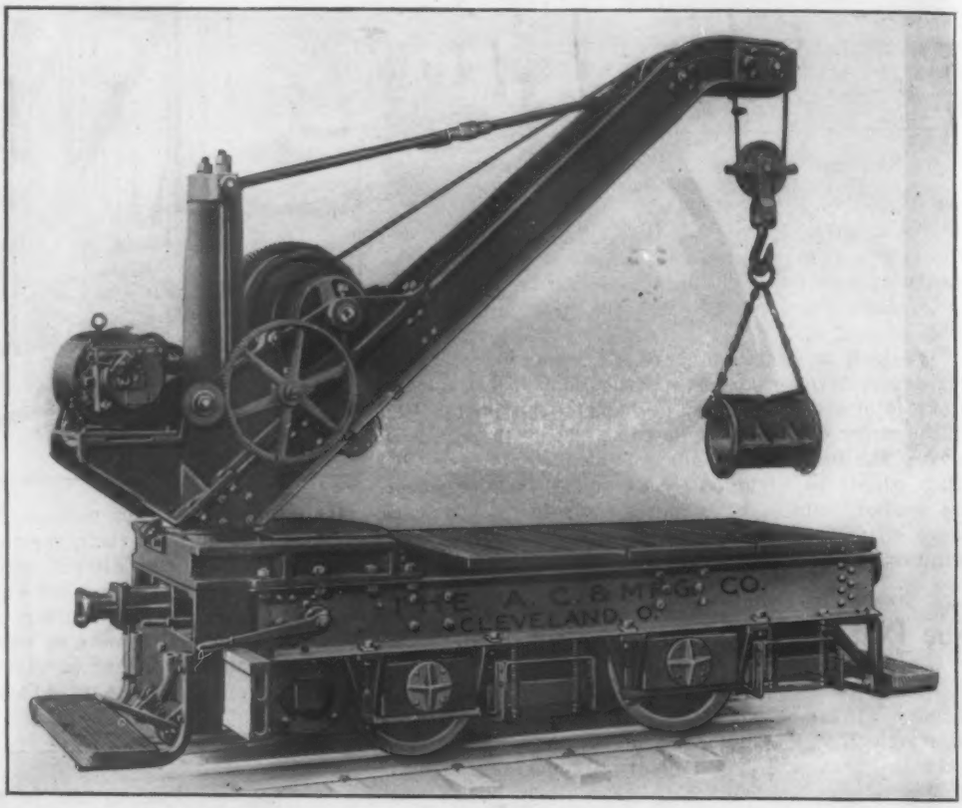


Fig. 1.—An Industrial Storage Battery Locomotive Crane Built by the Atlas Car & Mfg. Company, Cleveland, Ohio.

Maximum hight of lift above track, feet and inches	6 3
Hight from top of rail to top of car platform, inches	28½

A storage battery locomotive or car with a flat top, designed for both carrying and hauling, is also built without the crane in capacities up to 40 tons, and in various gauges. When loaded themselves to secure adhesion they are capable of hauling from one to two times their capacity. In connection with its electrical locomotives, the company makes a full line of industrial cars.

Among other new products of the company is the ladle car shown in Fig. 2. These cars are built very rigid and permit the easy pouring of metal. Various capacities can be furnished of either plain or geared ladles. Other cars especially adapted to foundrymen's use, include those for handling coke, coal, ashes, sand, &c., as well as core oven cars. The company also makes a full line of portable track, curves, crossings, turntables, switches, wheels, axles, &c.

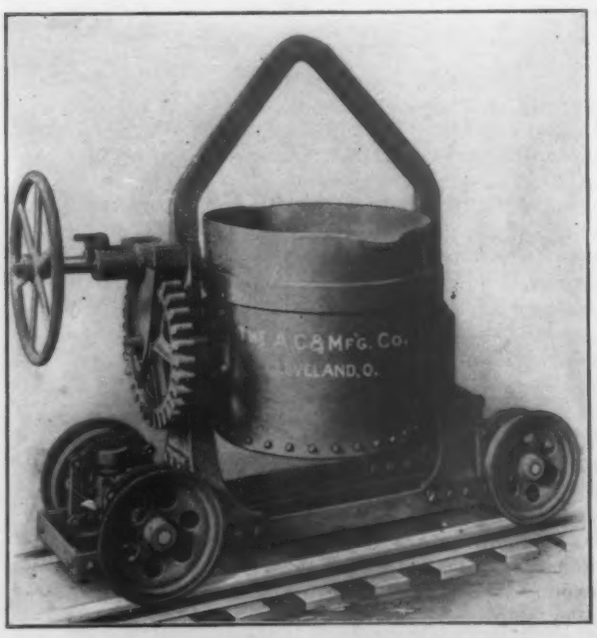
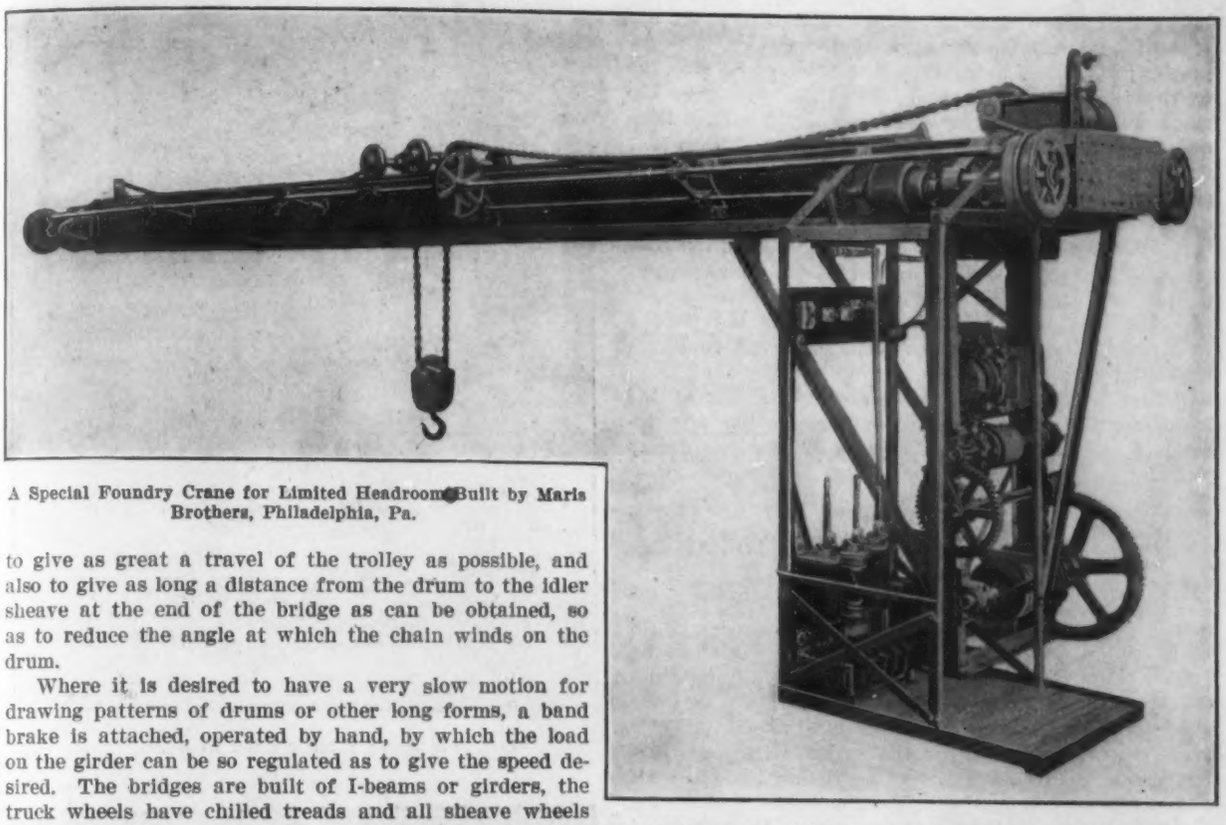


Fig. 2.—A New Atlas Ladle Car.

A Special Maris Foundry Crane

Maris Brothers, Philadelphia, Pa., makers of electric and hand cranes of various kinds, have a special foundry crane for use where the headroom is limited and it is necessary to lift a ladle of metal or other objects hoisted as high as possible above the floor. As may be seen in the illustration the hoisting mechanism, motors, &c., are placed at one end so that the heat from the molten metal will not affect them when the ladle is close up to the bridge.

All hoisting and traversing rigging is within easy access of the operator, and the controllers are placed to one side so as to allow a clear view of the load being hoisted. The hoisting rig is spread in a vertical direction



A Special Foundry Crane for Limited Headroom Built by Maris Brothers, Philadelphia, Pa.

to give as great a travel of the trolley as possible, and also to give as long a distance from the drum to the idler sheave at the end of the bridge as can be obtained, so as to reduce the angle at which the chain winds on the drum.

Where it is desired to have a very slow motion for drawing patterns of drums or other long forms, a band brake is attached, operated by hand, by which the load on the girder can be so regulated as to give the speed desired. The bridges are built of I-beams or girders, the truck wheels have chilled treads and all sheave wheels are bushed. Since the crane is built for steady hard usage all parts are simple in construction and all complications have been avoided.

The Delta and Changeezy Tramrail Trolleys

Among the improved devices on trolley systems for foundry, and other work are the Changeezy and Delta adjustable trolleys, and a trailing or automatic switch, made by the New Jersey Foundry & Machine Company, 90 West street, New York City. The trolleys are shown in Figs. 1 and 2. The Delta I-beam trolleys are made both plain and geared, and the Changeezy trolleys embody all of the features of a plain and geared trolley in a single piece of apparatus, and both Delta and Changeezy trolleys are adjustable. In outward appearance the Delta geared trolley, Fig. 2, is similar to the Changeezy trolley, which was described in *The Iron Age*, May 26, 1910.

Both types of trolleys are made with steel side plates and roller bearing wheels, with hardened axles. The side plates are connected so as to provide flexibility between the two plates, allowing the wheels on each side of the beam to adjust themselves to irregularities in the track, so that under any and all conditions each of the four wheels will carry a uniform load. The adjustability of the trolleys allows of a ready change, so that the trolley will fit any weight of three sizes of I-beam, as carried in stock, or any corresponding width of channels or angle irons placed back to back. This limitation to three sizes of beam with their various weights and various widths in which they are rolled applies to standard stock trolleys only, but trolleys of any desired adjustability can be shipped from the factory stock with delay of assembling only. I-beams also wear out, and very often have a material amount of variation depending on the condition of the rolls with which they were rolled, but this adjustability allows of the arrangement of the trolley with a proper clearance to the width of beam or flange to be used.

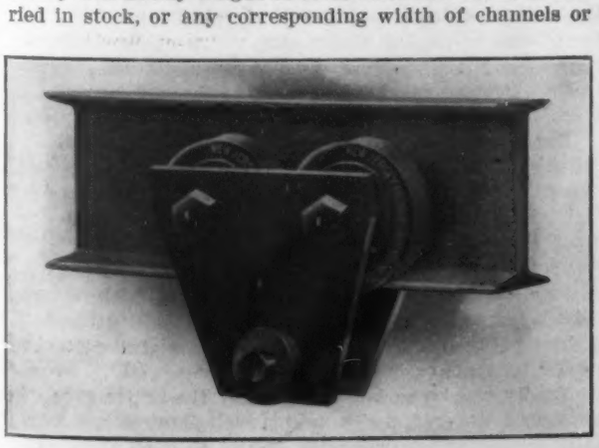


Fig. 1.—The Delta Plain Trolley Made by the New Jersey Foundry & Machine Company, New York.

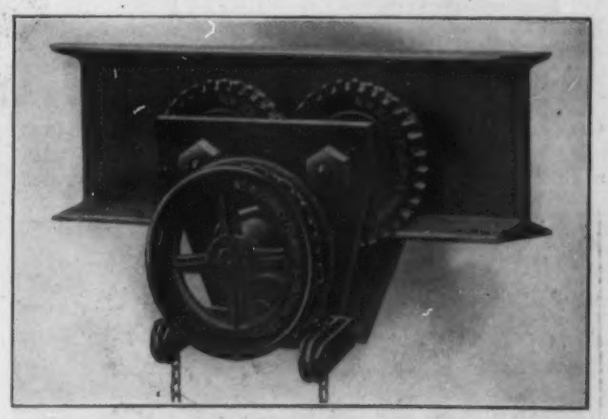


Fig. 2.—The Delta Geared Trolley.

The Delta geared trolley has two of the wheels geared and connected by a shaft and pinions for operation from the floor by a pendant hand chain. The Changeezy trolley is both a plain and geared trolley possessing all the advantages of both, and the change from one to another is instantaneous and accomplished entirely by pulling on the hand chain. The gear wheels in this trolley are connected by a pinion in identically the same manner as an ordinary geared trolley, but this pinion can be thrown in and out of gear by pulling the hand chain. This trolley can be used as a geared trolley when handling heavy loads, and as a plain trolley when handling light loads or no load.

The Delta automatic switch is a combination of an automatic switch operating device when the trolley is traveling in a certain direction, and a substitute for a trolley stop under all conditions. Where two lines are

brought by a switch to a single line the trolley in approaching the single line throws the switch into the proper position. The only time it is necessary for the operator to set the switch is when he is coming on the single line and wishes to go to one of the branch lines and the switch is set for the other branch, but in no case does the trolley come to a dead stop, the switch being set for the proper beam when traveling in one direction, or automatically setting itself to the trolley when traveling in the other direction. This not only saves the time required to stop and set the switch, but in foundry work is especially important, as it does away with the danger of spilling hot metal if an operator does not happen to notice that a switch is set against him and runs into a positive stop.

These trolleys and switches are only a few of the more recent improvements in the extensive line of overhead carrying devices manufactured by the New Jersey Foundry & Machine Company.

Yale & Towne Hoists and Trolleys

Its adaptability and economy in the foundry has led many to adopt a system of overhead tracks, equipped with trolleys and either hand operated or electrically driven hoists. For satisfactory operation it is essential that a load be hoisted easily and steadily, and that the operator have it under perfect control at all times. This may be accomplished with a chain block with spur gearing, giving high efficiency, and a friction brake, giving absolute control, or an electric hoist with direct connected motor and a graduated speed controller. Both types of hoist are made by the Yale & Towne Mfg. Company, Stamford, Conn.

Fig. 1 shows one of this company's Triplex chain blocks in use in a foundry. The sustaining mechanism is separate from the hoisting mechanism and does not augment the resistance to be overcome in hoisting. Fig. 2 shows an electric hoist designed to give uninterrupted service and operate at minimum cost. The hoisting gears are so arranged that, even if the brake is removed, the load will be sustained, while the controller is equipped with a large number of contacts arranged to give graduated speed.

The trolley to convey the hoist and load along the track, as made by this company, is exceptionally strong and easy running. One of them used in connection with a chain block is shown in Fig. 3. The trolley operates

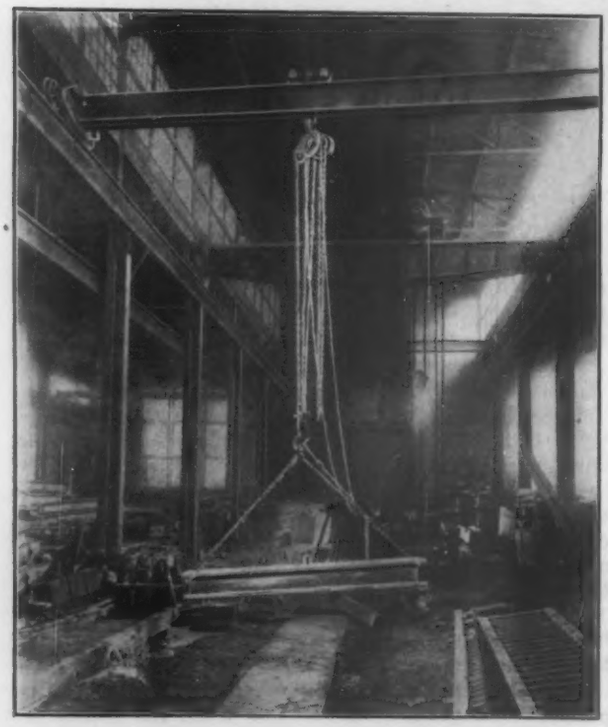


Fig. 1.—A Foundry Crane with a Triplex Chain Block Made by the Yale & Towne Mfg. Company, Stamford, Conn.

Fig. 2.—A Yale & Towne Electric Hoist as Used in a Foundry.

Fig. 3.—A Yale & Towne Triplex Block and Trolley for Inter-Works Transporting.

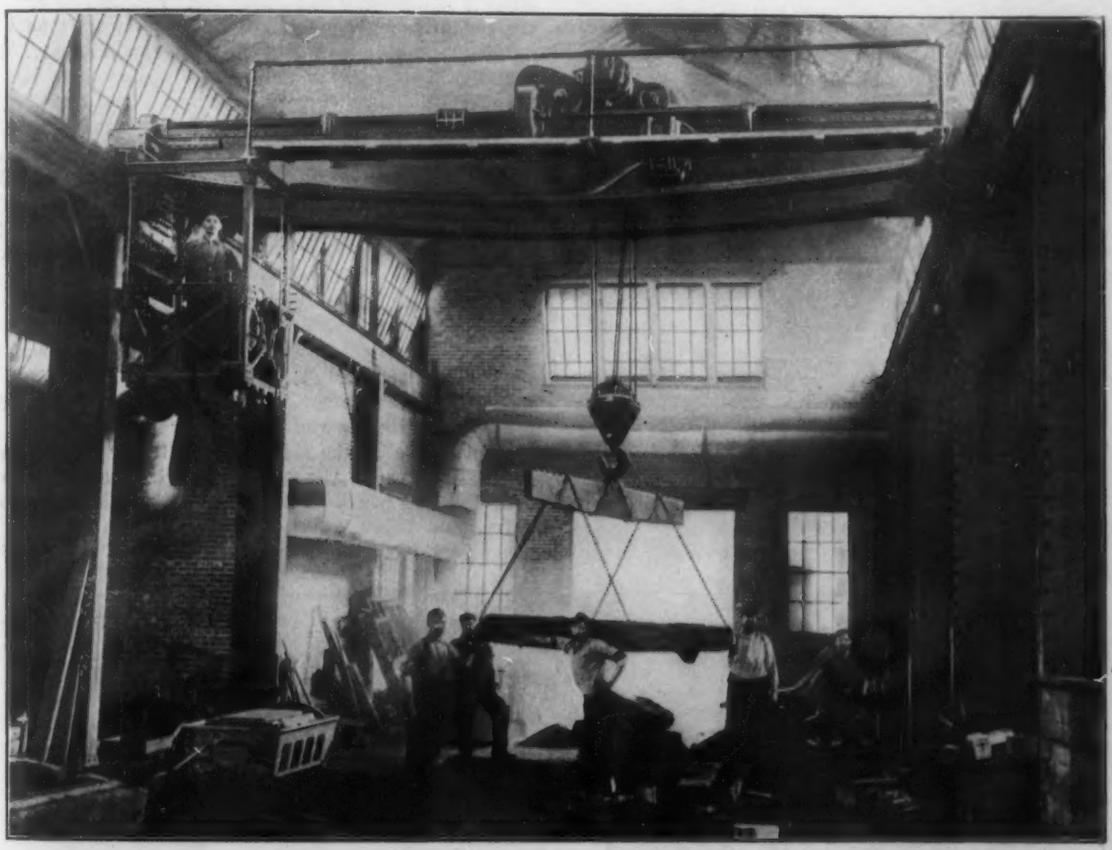
freely because each wheel inclines at a right angle to the running surface of the track, and each axle is pressed into the wheel and supported at each end in a bronze bearing, which is self-adjusting, dustproof and self-oiling. Each wheel adjusts itself to the track independently of the others, which facilitates easy movement and steady running on sharp curves as well as straight track. These trolleys run as easily after many years of service as when new.

For the track a light section I-beam is especially suitable, for it gives lateral stiffness as well as transverse strength, and the supports can be placed at considerable distance apart. The standard size of beam to use for a carrying capacity of 1 ton is 6 in., 12¼ lb. per ft., with supports not more than 13 ft. apart. I-beam track may be suspended by bolting directly to timbers with hanger bolts keyed to the I-beam, as in Fig. 3, or where there is a drop between the supporting beams, and the tracks special brackets or hangers may be used.

Tracks can be so laid that nearly the entire area of the floor is covered, and a system well planned and carefully erected will increase the output of a plant as well as decrease labor expense.

Shepard Electric Foundry Cranes

The following describes a typical foundry installation of a fully inclosed overhead electric traveling crane, built by the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. Although the motors and other electrical parts are wound for alternating current, this installation has proved entirely satisfactory in the most exacting requirements of a gray iron foundry. The plant, the Frontier Iron Works, Buffalo, N. Y., manufactures a line of large and small castings varying in weight from a small automobile or marine motor cylinder to a bed plate or frame of a large machine tool weighing up to 15 tons. The crane is used for all the work from the rough, quick unloading of pig, coke, sand, &c., to the careful, delicate work of closing molds, drawing patterns, &c., including handling the ladle for pouring. Its most severe service is shaking out castings. In two years' use no repairs have been needed, and no signs of wear are evident. All working parts are inclosed from dust and grit in a solid cast iron frame, which forms their support as well as covering, and all gearing, shafts, &c., run in oil, so that very little cleaning and lubricating attendance is required.



A Crane in the Frontier Iron Works, Buffalo, N. Y., Built by the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.

The illustration shows the crane at one end of the foundry about to place the cope on the mold. At the other end the runways extend out of doors where the crane has no other covering than the hoist frame, which forms the housing for the gearing as well as its protection from the weather. Outside the machine is used for unloading coke, which is shoveled into a bucket suspended from the hook, then carried into the foundry and dumped into storage bins.

Planetary gearing is employed throughout the hoisting element of the crane. The gearing and all its related shafts and bearings are kept in perfect alignment, because the bearings are bored in the hoist frame and bushed with hard bronze. The torsional movement, which occurs in the frames of crane trolleys, due to inequalities of the track or runway or wear of truck and trolley wheels and their bearings, has no injurious effect upon the Shepard trolley, because all the hoisting mechanism has a common axial position; the frame of the trolley is arranged to keep this axis constant under all conditions, so that all shafts have a constant position in their bearings. Similarly all gear teeth retain their original adjustment, thus distributing the stresses which they carry and the wear incident to their operation over the entire tooth surface.

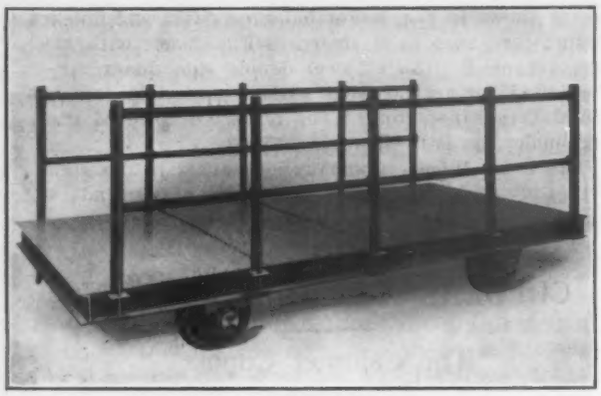
The hoist is equipped with both a mechanical or load brake and an electric or motor brake, either capable of holding the load at any position. The load brake acts directly on the driving shaft, and sets immediately upon stopping the motor. It is located within the hoist frame or shell and runs in oil, insuring uniform braking power, irrespective of the load handled and rapid radiation of heat. The electric brake is keyed to the armature shaft and stops it the moment current is cut off from the motor. Its braking surfaces also run in oil.

The trolley drive is inclosed in its own gear case. The gearing runs in an oil bath, and the bearings are ring oiled. The bridge drive with its brake is also inclosed in a dust tight case. The gear and pinion run in oil as well as the bearing surfaces of the brake. The truck wheel gears are protected from dust and dirt by cast iron cases, but owing to their slow motion it is not necessary to run them in oil.

Although the crane is so fully inclosed the working parts are accessible. By removing six square head cap screws the hoist head may be removed, after which each part may be taken from the hoist without the use of tools. One man with a helper can completely disassemble and reassemble one of the largest crane trolleys in from 45 to 60 min. with a monkey wrench and screw driver.

Monarch Core and Annealing Oven Cars

The name of the Monarch Engineering & Mfg. Company, Baltimore, Md., is identified among foundrymen with the Steele-Harvey crucible melting and refining furnace, using oil or gas for the melting of metals, which has heretofore been described and illustrated in these columns. One of its features is the retention of the crucible in the furnace and thus the lengthening of its life as compared with use in pit furnaces. The company



Monarch Core and Annealing Oven Car with Detachable Sides.

is also designer and manufacturer of the Monarch portable tilting furnace, the Monarch nontilting crucible furnace and the stationary furnace designed for melting in foundries making light castings where hot fluid metal is required for quick pouring in molds.

Among other equipment manufactured by this company is a metal car for core and annealing ovens. As shown in the illustration this car has detachable sides. It is furnished with dustproof boxes, and may be arranged with fire brick tops for carrying molds to be placed under tilting furnaces for direct pouring. The company's name is also identified with the Monarch core oven, portable heater, fuel oil burner and positive pressure blower.

Ridgway Foundry Elevators

Getting stock up to the cupola is perhaps the most important single operation in a foundry. For many years all devices for elevating materials to the cupola were so troublesome and uncertain that it was common to use wheelbarrows on inclined runways from the yard to the cupola platform. While this was slow and expensive it was absolutely sure. In recent years an elevator has been evolved for foundrymen by William H. Ridgway of the Craig Ridgway & Son Company, Coatesville, Pa., which seems to fill the exacting requirements of foundry cupola service.

The history of the Ridgway elevator is interesting as it was the foundrymen who really brought it into existence. The company was manufacturing a balanced hydraulic crane operated by steam, which became popular in foundries. This led to requests for and the development of a cupola elevator working on the same principle, and to-day the present perfected Ridgway steam-hydraulic elevator is widely known among foundrymen.

The elevator consists primarily of two cylinders, one the lifting cylinder and the other the water cylinder, the latter a little larger than the former. The two cylinders are connected by a valve controlled pipe and the water cylinder is similarly connected to the steam supply. Figs. 1 and 2 show two common styles of machine, such as are used for taking stock up to cupola platforms.

To operate the elevator, steam is admitted to the water cylinder, and, being prevented from coming in contact with the water by a body of air between them, instead of condensing, forces the water to the lifting cylinder at the steam pressure and moves the piston or ram as the case may be. To lower the elevator the steam is exhausted, and the pressure being relieved the water flows back to the water cylinder. The same water is used over and over. The speed of the elevator is regulated by a hand cable from the cage, and the machine is under perfect control at all times.

A device in the top of the water cylinder called a spreader distributes the steam over the top of the air, while a device on the side of the cylinder maintains the air space between the steam and the water. The air being twice as heavy as the steam will remain next to the water, and being a nonconductor of heat insures the prompt action of the elevator.

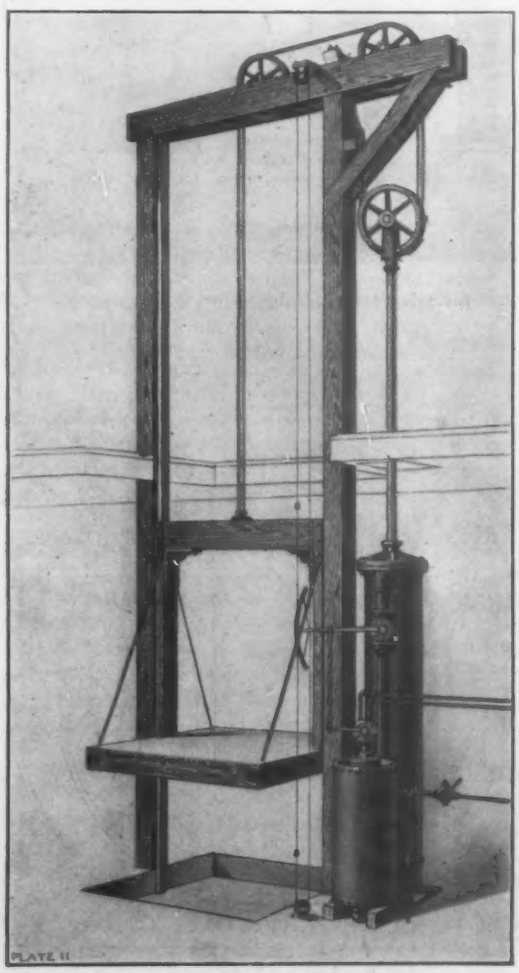


Fig. 1.—Double Geared Elevator.

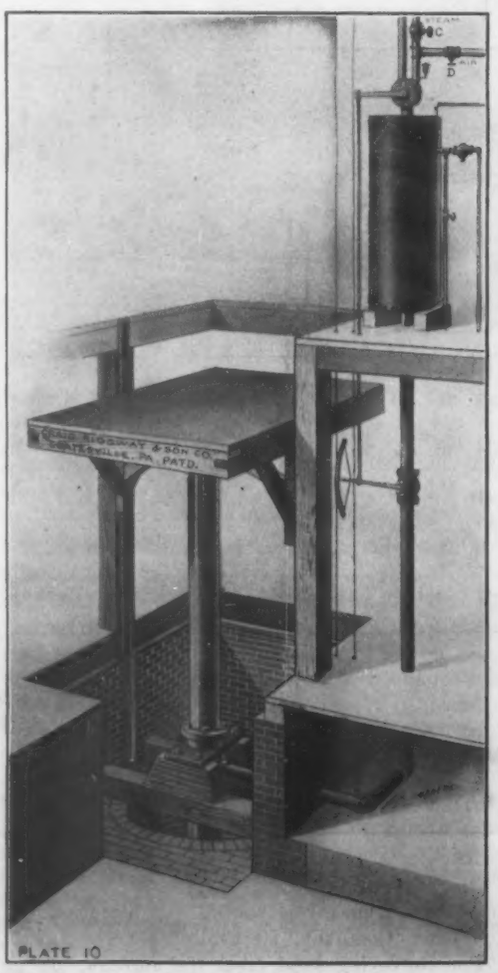


Fig. 2.—Direct-Acting Elevator.

Two Types of Foundry Elevators Built by the Craig Ridgway & Son Company, Coatesville, Pa.

Ernst Wiener Foundry Cars

Industrial railroad systems provide economical means for handling sand, lime, coke, pig iron, molten iron, castings, &c. A typical installation comprises track of 16-lb. rails, mounted on steel ties, switches made up in the

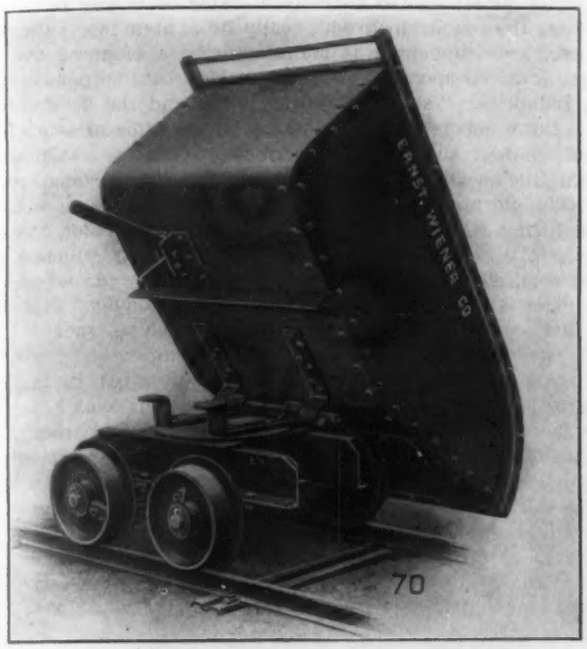


Fig. 1.—A Dumping Car Suitable for Sand Conveying Made by the Ernst Wiener Company, New York.

same manner and turntables of design to suit requirements, steel double side or rotary dumping cars, ladle cars and steel top flat cars. No matter from where or what part of the plant materials are to be transported the track system is always ready, while other conveying

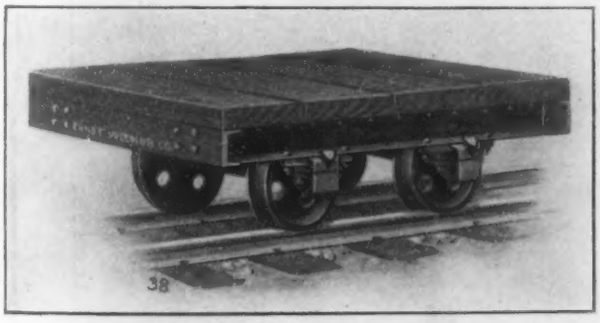


Fig. 2.—A Flat Car, Also Made with Steel Top.

systems may be busy at some other part of the shop, thus delaying the workman and losing considerable time. Even in a small foundry a track system is a valuable addition for handling material in course of manufacture, and its usefulness in foundries is generally almost without limit.

The practical application of industrial railroads in

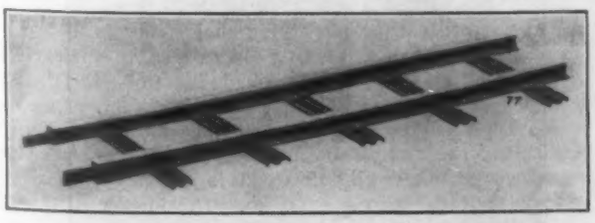


Fig. 3.—A Section of Portable Track.

foundries has been given special consideration by the Ernst Wiener Company, 50 Church street, New York City. For conveying sand from the storage pile to the various points where it is used, this company recommends the car shown in Fig. 1. For handling flasks and finished product cars, such as is shown in Fig. 2, but with steel tops, are used. The all-steel double side dump car is often used for transporting various materials and has proved very satisfactory. The preferred form of track for foundry use is illustrated in Fig. 3.

The Ernst Wiener Company specializes in the manufacture of industrial railroad equipment of all kinds, including a great variety of cars and locomotives.

CUPOLAS AND OIL BURNERS

The Calumet Cupola

A thick lining at the melting zone and the proper ratio between tuyere area and cupola area are features of the design of the Calumet cupola of the Calumet En-

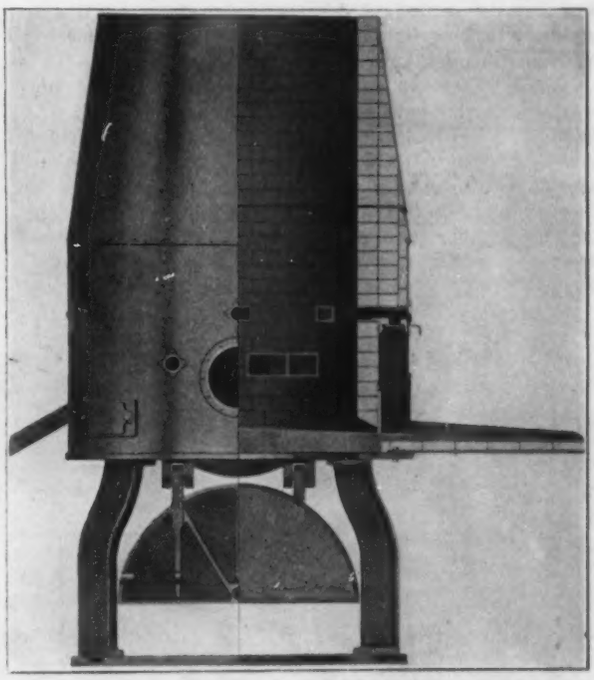


Fig. 1.—Furnace Section of the Calumet Cupola.

gineering Works, Harvey, Ill. The lining at the melting zone is 9 to 12 in. on smaller cupolas, and 14 to 15 in. on the larger sizes. To insure an even distribution of blast to the tuyeres two blast entrances are provided, one directly opposite the other. The thick lining at the melting zone is designed to reduce to the smallest degree

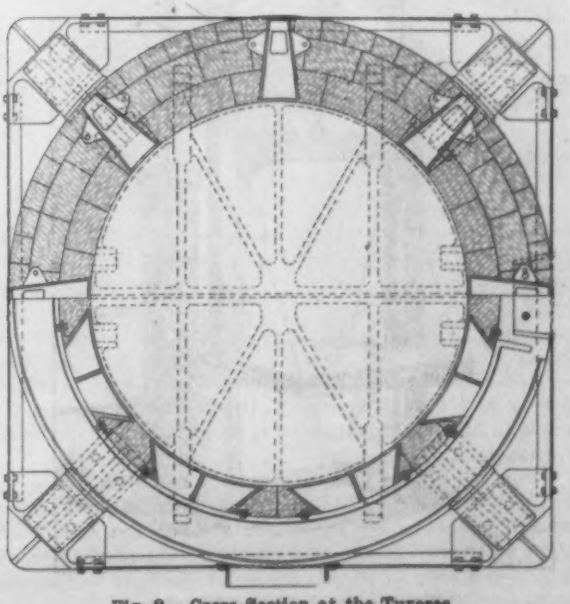


Fig. 2.—Cross Section at the Tuyeres.

the loss of heat by radiation. The tuyeres are of the rectangular expanded type, proportioned both to the cupola area and to the outline of standard blowers. The upper tuyeres, which serve their usual function of furnishing an air supply for more complete combustion, are equipped with dampers so that they may be closed when desired. A safety tuyere near the slag spout prevents the molten iron from rising and flowing through the lower tuyeres. In the larger cupolas there are eight upper and eight lower tuyeres. The wind box is placed on the inside of the main shell of the cupola. This prevents loss of blast and permits outside inspection of the main body sheet. While the cupola is fitted with two blast nozzles a single blast entrance may be used, having a partition wall in the center, so as to divide the blast and distribute it equally around the tuyere area. The greater thickness of lining, besides preventing loss of heat by radiation, protects the shell from the effects of high temperatures.

Fig. 1 shows the construction of the furnace section of the cupola, and Fig. 2 is a horizontal section through the tuyeres.

spout of the safety overflow removed. All of these parts also are machined.

There is one upper and one lower row of tuyeres in the cupola. The upper row has gates allowing any or all of the tuyeres to be closed if desired. The tuyeres are flaring in shape and admit the blast through a small area in the shell which is expanded into a large horizontal opening inside of the cupola. The air is thus permitted to reach the fire through an area nearly double that through which it enters the tuyeres.

The cupola stack, not shown, is made of steel plate riveted in sections with downward joints, and is convenient for erection. It also has the advantage of shedding water and keeping it out of the joints, preventing rust of shell and damage to the lining. The lining supports are cast iron placed inside the stack, and wide and strong enough to support the brick lining above them. One shelf is placed just above the charging doors and one about every 10 ft. above this point. Another is placed immediately above the air chamber allowing that

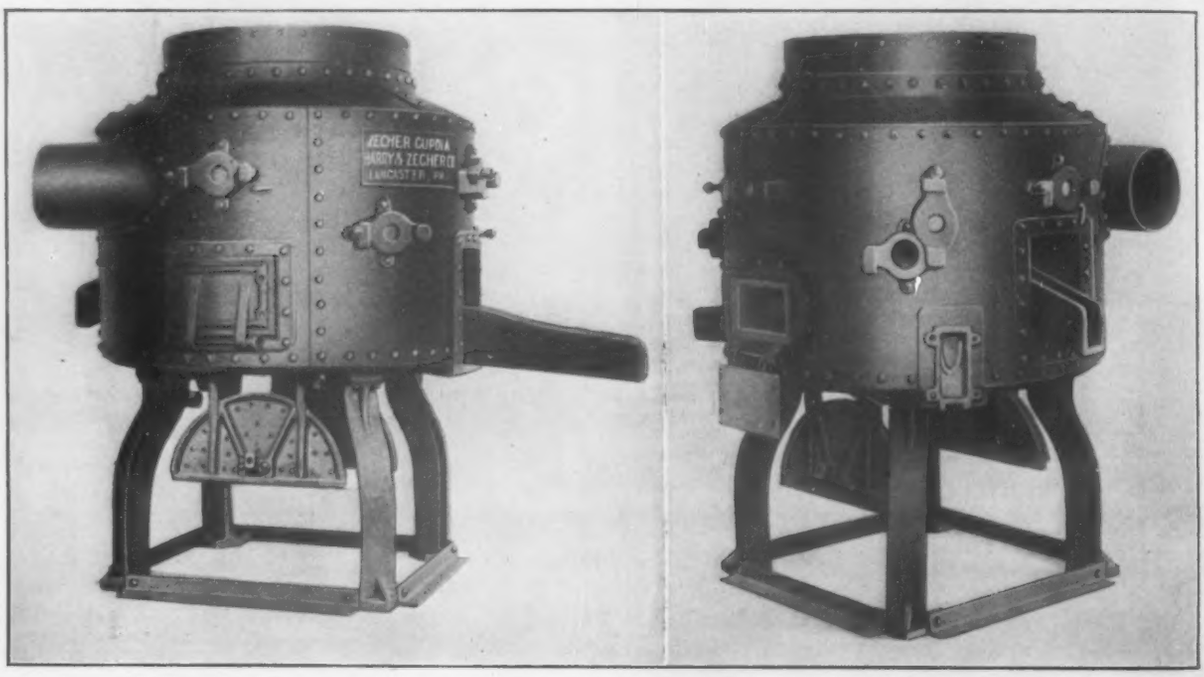


Fig. 1. Fig. 2.

Two Views of the Body Section of the Zecher Cupola Built by the Barry & Zecher Company, Lancaster, Pa.

The Zecher Cupola

A new line with the Barry & Zecher Company, Lancaster, Pa., is the Zecher cupola declared to be the heaviest and strongest made. Among the points of advantage are that the cleaning doors are hinged so that when open they will hang down, and both frames and doors are machined so that when closed and bolted they will be air tight, and a safety tuyere is provided having an overflow on the outside of cupola, which makes it impossible for any iron to get into the air chamber. Another improvement is the use of compression springs to keep the peep-hole covers tight against the frame so that no air can escape. At the same time the cover can be easily opened when necessary and can be kept partially opened if desired. The slag spout is also of improved design and does not require lining. These cupolas are made in all standard sizes from 36 to 102 in. in diameter, inclusive.

Fig. 1 is a side view of the body section showing the hinged cleaning door and the peep-hole frames and covers. These parts are all machined, making the cupola air tight and securing the full benefit of the blast pressure. Fig. 2 is a view of the other side of the body section and shows the cleaning door and peep-hole cover open, and the portion of the lining below to be repaired or replaced without removing the upper portion.

With each cupola is furnished a blast gauge to be attached to the air chamber for registering the pressure of the air blast. The blast pipe nozzle is arranged to enter the air chamber on a tangent forcing the blast around the shell. If desired two blast pipe nozzles may be used, one on each side of the cupola. The tapping spout is of cast iron, and furnished in any length desired.

Hauck Portable Oil Burners

For lighting cupolas, drying molds and ladles, preheating and general heating operations a variety of types of oil fuel burners are made by the Hauck Mfg. Company, 140 Cedar street, New York City. One of these applications, cupola lighting, is shown in Fig. 1, indicating the method of applying the burner. Use of shavings or other kinling wood is entirely eliminated and with it the smoke nuisance. The burner is placed in the spout at the tap hole or breast or at a specially cut hole. The flame is directed by compressed air against the coke bed producing ignition without injuring the cupola lining, enabling the fan blast to be started in a short time and insuring clean hot iron, since no ashes are present. It is claimed that the expense saved in lighting cupolas this way will pay for the burner in

one to six months. The same burner can also be used for drying ladles and skin drying cores and molds. For drying ladles it is usual to attach the burner to a pipe extending into the ladle. The flame is conducted to the bottom of the ladle and heats the bottom and sides evenly without injuring the lining. Small hand ladles

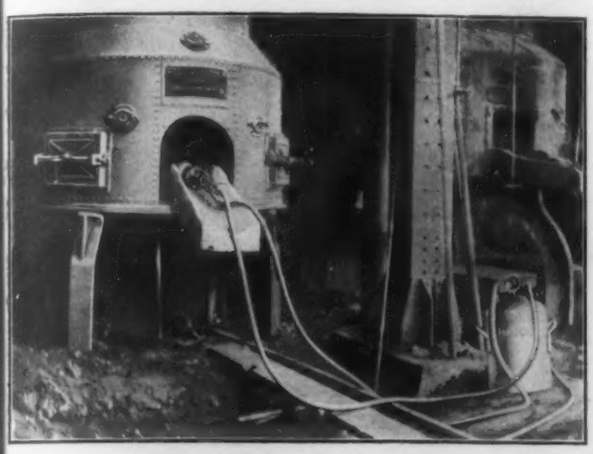


Fig. 1.—Firing a Cupola with the Portable Oil Burner Made by the Hauck Mfg. Company, New York.

can be placed over the top of the large ones and dried at the same time with the escaping heat.

Another interesting application of the burners is shown in Fig. 2, this being in connection with repairing defective castings. It shows the method of applying the burner to preheat the defective part if necessary to the melting point, allowing the fluid metal to amalgamate with the casting more readily without undue expansion and possible cracking. The burners are also used only to preheat the metal, the welding being accomplished with an oxy-acetylene blow-pipe. This burner is of the

Fig. 2.—Preheating a Defective Casting with a Portable Oil Burner Preparatory to Repairing.

same general type and may also be used for skin drying molds. It offers the advantages of time saved, since the burners can be instantly lighted, and of more uniform work, since the soft blue flame can be easily regulated to spread over a large area or with a small pointed flame to be concentrated on a limited area.

Often in baking molds the flame from the burner is driven into specially constructed sheet iron boxes, lined with asbestos, so that the heat is reflected to the molds under the boxes. Two general classes of burners are made, one operated with compressed air, which is the preferred type where air is available, under any pressure from 5 to 100 lb., and an independent self-contained type having a hand air pump fastened to the tank. Any grade of fuel, crude or kerosene oil may be used.

The company also makes lead melting portable furnaces, which can be used either with compressed air or without, and applied to the melting of soft metals such as babbitt, &c., stationary brazing forges equipped with a burner and tank complete for use, and portable brazing forges with a portable burner attached to be used as a blow torch.

The Whiting Cupola

The latest improvements in the design and construction of the cupola built by the Whiting Foundry Equipment Company, Harvey, Ill., are shown in the illustrations. Fig. 1 is a body section of the standard cupola and shows the four foundation plates, one under each column connected by angle bars. The columns are

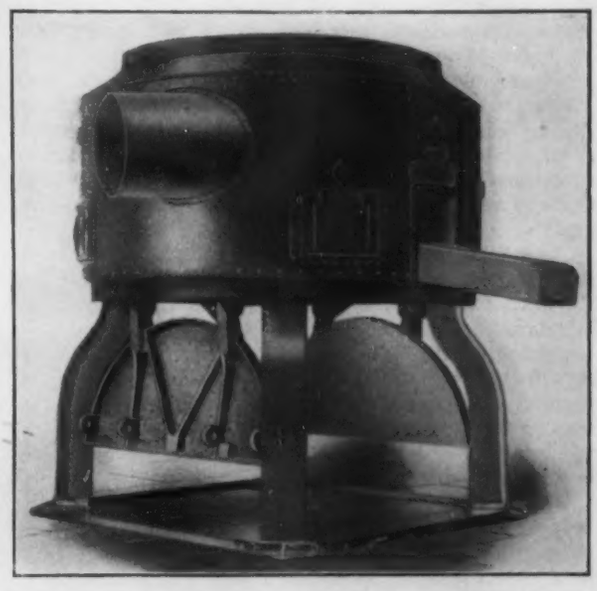


Fig. 1.—Body Section of the Standard Cupola Built by the Whiting Foundry Equipment Company, Harvey, Ill.

curved, allowing clearance for swinging the bottom doors and are of heavy T section. The bottom plate is a new design with a heavy vertical rib, and the bottom doors are also heavily ribbed and have vent holes as shown. All of the larger cupolas are fitted with lugs for the lever arm used in connection with a bottom door hoist.

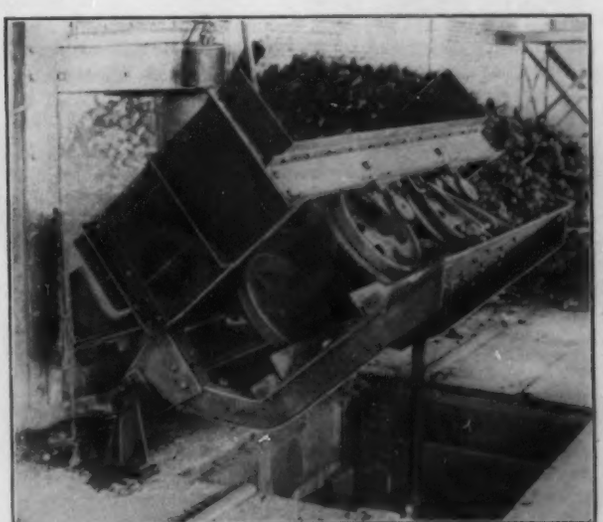


Fig. 2.—A Whiting Car Dumping Charging Machine for Large Cupolas.

At the bottom, the wind box, which is of large capacity, is bolted to a flange on the bottom plate and is joint cemented. Its top is formed of flanged plates and riveted to the shell, all joints being calked air tight. The tap and slag hole frames are cast iron and are

bolted to the shell and wind box plate and are also joint cemented. The cleaning doors are large and readily opened for inspection. The blast entrance is tangential to the wind box.

The tuyere system is of the flaring design, the lower tuyeres forming practically an annular inlet inside of the lining, which provides equal distribution throughout the area of the cupola and softens the blast, insuring greatest life to the lining. The hight of the lower tuyeres is adjustable for different classes of work, and the upper tuyeres are bolted to the shells and are fitted with independent gates. One of the lower tuyeres has a safety device consisting of a funnel formed in the bottom plate, to which is fitted a slide having an opening closed with heavy paper. If metal or slag overflows the tuyere it drops into the funnel and burns out the paper, giving warning to the cupola tender. The upper and lower tuyeres have peep hole frames and covers with machined joints.

Heavy plates are used in the shell, and the body section is extra heavy with close rivet spacing. Brick lined, cast iron, or screen charging doors are furnished. Shelf angles are bolted to the shell at proper intervals to support the lining, and at the top of the stack is an angle to keep the weather out between the lining and the shell.

The Whiting cupolas are made in 16 sizes, with capacities ranging from ¼ to 30 tons per hour. The No. 12, having a 108-in. diameter shell, is the largest size standard cupola manufactured. In it a structural steel frame work with a steel plate is substituted for the cast iron bottom plate, and the legs are columns of special design. Charging machines, as illustrated in Fig. 2, may be furnished for the larger cupolas. These are great labor savers and operate by compressed air as shown, or by an electric motor.

Other products of the Whiting Company, which can only be mentioned for lack of space, are tumblers, core oven equipment, overhead trolley systems, converters, malleable furnaces, annealing ovens and cranes of all kinds as well as air hoists.

The Newten Cupola

In the construction of the Newten cupola the Northern Engineering Works, Detroit, Mich., has given special attention to economizing the blast by preventing leakage of air around the blast chambers. To this end the blast chamber or air box is steel calked to remain practically air tight under all conditions. It is placed on the outside, where it is accessible from all sides, and the bottom is raised above the bottom plate to permit inspecting the bottom of the cupola shell. The safety tuyere is also noteworthy and the adjustability of the tuyeres whereby they may be raised or lowered to suit different conditions of work. Among special advantages cited for the cupola are rapid continuous melting, high fuel economy, saving in wear on the lining and ability to handle a wide range of work. Fig. 1 shows the furnace section of the cupola, and Fig. 2 a horizontal section through the lower tuyeres.

In Fig. 2 it will be seen that the main tuyeres are of the expanded type and of large area to insure the transmission of sufficient air to the furnace. The main tuyeres each have two supporting ribs placed at an angle, slightly contracting a small portion of the blast, to force it toward the proportionately smaller area at the center of the furnace, while the expanded blast supplies the larger area nearest the lining resulting in a differential blast covering the entire area of the furnace. The lower tuyeres are adjustable vertically several inches to suit either a deep or a shallow bed of fuel, adapting the furnace to either coke or coal or to any change in the inside diameter to suit different classes of work. One tuyere has a low spout connected with a soft metal plug in the cleaning door. This is burned out and gives warning if the molten metal rises too high. On cupolas larger than 36 in. in diameter there are several additional upper tuyeres of much smaller area, supplying air to assist combustion and utilize the escaping gases.

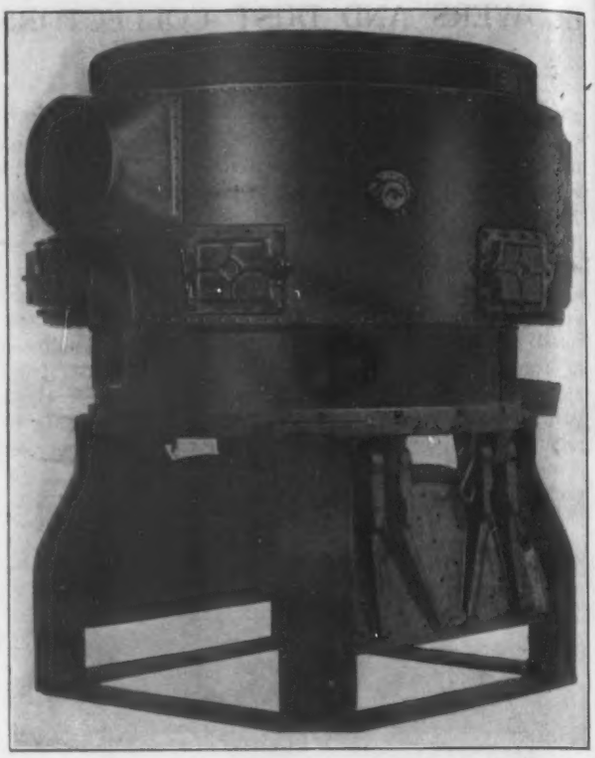


Fig. 1.—Rear View of the Furnace Section of the Newten Cupola Built by the Northern Engineering Works, Detroit, Mich.

These tuyeres have dampers to close them if desired, as the main tuyeres have ample area for the required capacity.

Fig. 2 also shows the cleaning doors, through which is afforded access for cleaning and inspecting, and the peep holes opposite each tuyere. The blast entrance divides to evenly distribute the blast on both sides of the furnace. Both the cleaning doors and the peep holes have planed and fitted joints with adjustable fastenings. The charging door is extra large, and its frame has a heavy iron slide or apron at its base protecting the lining. Two charging openings are provided on all cupolas larger than 72 in. The stack is extra heavy steel riveted in sections and having down-opening joints. Angle

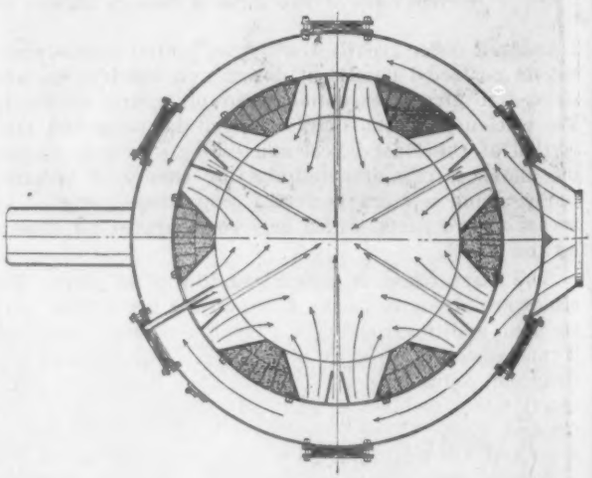


Fig. 2.—Horizontal Section Through the Lower Tuyeres of the Newten Cupola.

shelves riveted inside the stack a suitable distance above the melting point and at frequent intervals beyond support the lining during repairs. The Newten cupolas are made in all sizes from 30 to 108 in. diameter of shell.

Other products of the Northern Engineering Works of interest to foundrymen are electric and hand cranes of all types, hoists and tumbling barrels. The largest of the latter is 4½ ft. in diameter, 7 ft. long and extra strong for tumbling heavy work.

BLOWERS AND DUST COLLECTORS

Sturtevant Foundry Blowers

The size of the cupola, the air pressure required and the duration of the melts determine largely whether the centrifugal or the positive type of blower is most suitable. The first is a high speed machine and its pressure is limited, being seldom more than 16 oz., making it best adapted for medium and small cupolas requiring moderate pressures. On account of its high speed it is not as satisfactory for long and continuous melts as a slow speed positive blower. The latter is also best adapted to large cupolas and where forcing is necessary requiring high pressures. The B. F. Sturtevant Company, Hyde Park, Mass., makes both types of blowers. At the higher pressures the power required to drive the positive blower is somewhat less than that required to drive the centrifugal blower of the same capacity, which is another point in its favor.

In general appearance the steel pressure blower, Fig. 1, does not differ greatly from other centrifugal blowers, but its perfected details of design and construction are claimed to give it exceptional durability and efficiency. The efficiency depends largely upon the form and proportion of the blast wheel and casing. In this blower the casing is cast iron, eliminating chance of leakage, and securing a more perfectly proportioned scroll. It is cast in two parts, which may be separated for inserting the wheel.

The blast wheel is galvanized thin steel plate. Its blades are strengthened by flanging and are curved, giving them additional strength. Being accurately balanced it runs smoothly, even at high speed. The bearings are dustproof, extra long, easily adjustable, lined with Sturtevant white metal and positively lubricated by an oil cup and wick. These blowers are made in a number of sizes, and are adaptable to a wide range of cupola capacities by being operated at suitable speed.

The positive or high pressure blower, Fig. 2, differs radically from others in that the entire work of compression is done by the impeller on the main driving shaft. The other rotor serves only to pass the impeller blades from the high to the low pressure regions without loss of compressed air. The power required to drive it at its slow speed is negligible.

Between the rotors and between them and the casing is sufficient clearance to prevent their coming in contact, avoiding the necessity of frequent adjustment. The casing is cast iron in the shape of two hollow cylinders partially intersecting. The larger one contains a hollow core attached to either end plate and divided at its center into two parts. In the annular space between this and the casing the impeller revolves. This consists of three diamond shaped blades, a central web and a hub keyed to a steel driving shaft. The impeller web revolves in a space between the two sections of the internal core and the blades; shell and core inclose three separate pockets which carry the air from the inlet to the discharge. The idler revolving in the smaller cylinder of the casing successively provides chambers for the return of the impeller blades to the low pressure side.

The pressure of the air presents no resistance to the rotation of the balanced idler, which is revolved at the same speed as the impeller through spur gears. These blowers have adjustable bearings with ample lubrication provision, and for foundry use are equipped with relief valves which may be adjusted for any pressures within the capacity of the blowers. These blowers are made in seven sizes, and, operated at different speeds, are suitable for cupolas melting from 1 to 30 tons of iron per hour.

Among other products of the company which have application in the foundry are its exhausters for connection to tumbling mills and its heating and ventilating equipment.

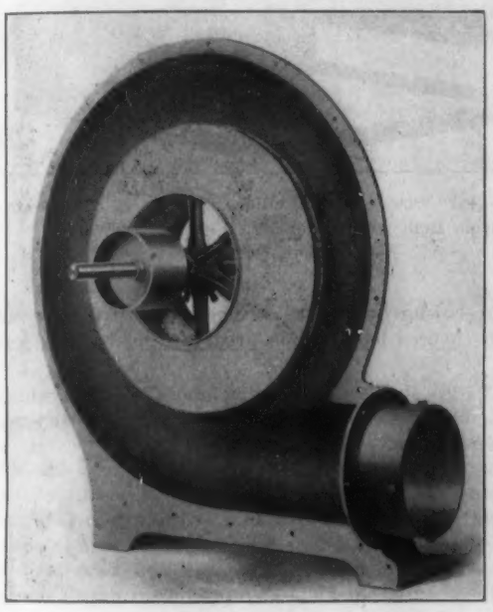


Fig. 1.—Steel Pressure Blower.

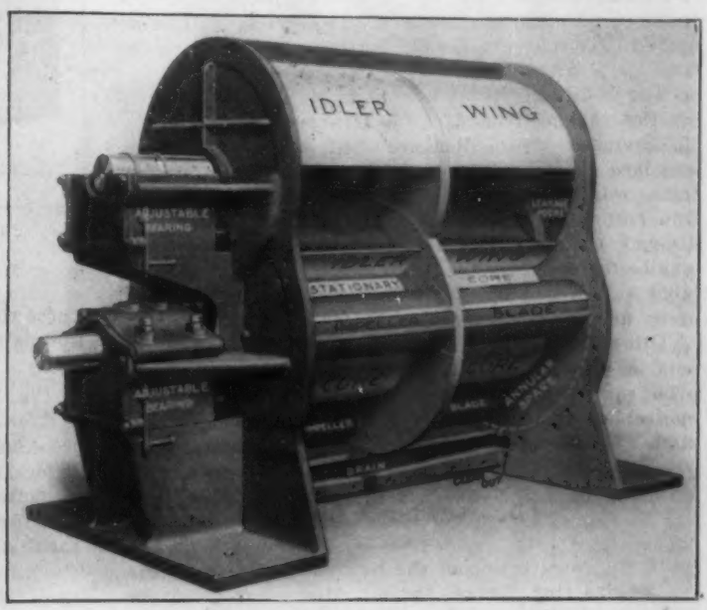


Fig. 2.—High Pressure Blower.

Interior Views of Two Types of Foundry Blowers Made by the B. F. Sturtevant Company, Hyde Park, Mass.

The Morse Dust Collector

A dust collector operating on the partial vacuum system, and hence given the name Rarefied, is manufactured by the Knickerbocker Company, Jackson, Mich. It has been designed especially for use in connection with foundry tumbling mills, sand blasts and emery wheels.

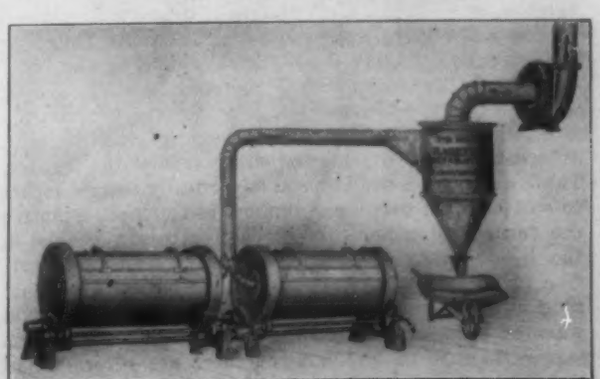


Fig. 1.—The Morse Rarefied Dust Collector Connected to Tumbling Barrels.

The collector, as shown in Fig. 1, is located between the fan and the dust producing mechanism, the fan drawing air through the collector and maintaining a constant vacuum tendency in the collector casing. Thus a separation of the fine particles from the air current is secured before the air reaches the fan, and thus the abrasion of metallic or flinty products on the fan parts is largely eliminated without undue wear on the collector parts.

Referring to Fig. 2, the dust spout is connected to the collector at the tangential inlet A, while the fan inlet is connected with an exhaust pipe opening in the collector at J. The fan establishes an air current through the exhaust outlet, creates a rarefied air condition in the areas B, C, and D, and draws the material laden air into the casing at the tangential inlet A. The centrifugal action causes the heavier material particles to be projected toward the inner dividing casting E, where they pass through the skimmer F into the rarefied chamber C. A lighter grade of dust travels along the walls to the chamber B, and the very light dust which has not sufficient momentum to overcome immediately the draft of the air current, passes toward the center with the inwardly flowing air and escapes to the rarefied or vacuum chamber D, which is open to the air wheel. The purified air passes out of the collector through the axial exhaust pipe at J and thence through the fan. As the material accumulates in the chambers B, C and D, it will fall to the bottom and discharge of its own weight through the automatic trap G.

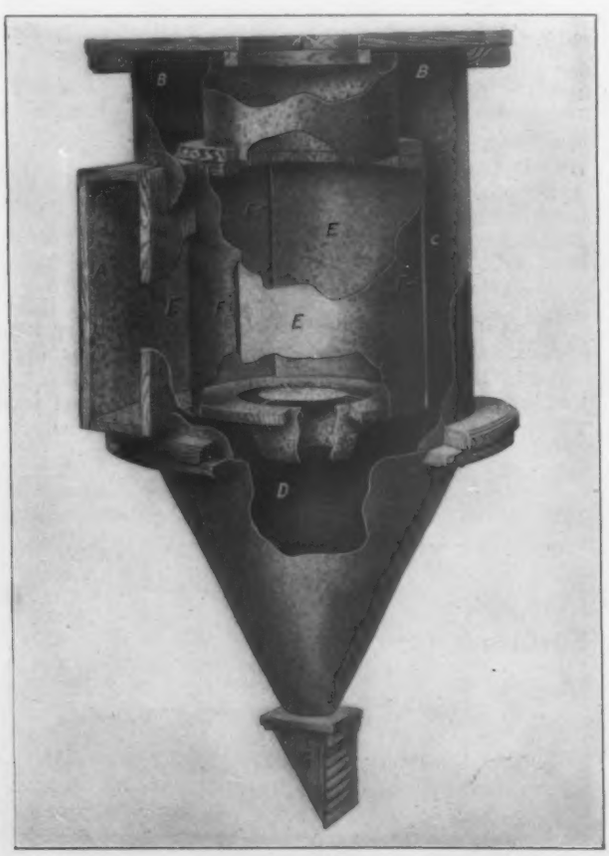
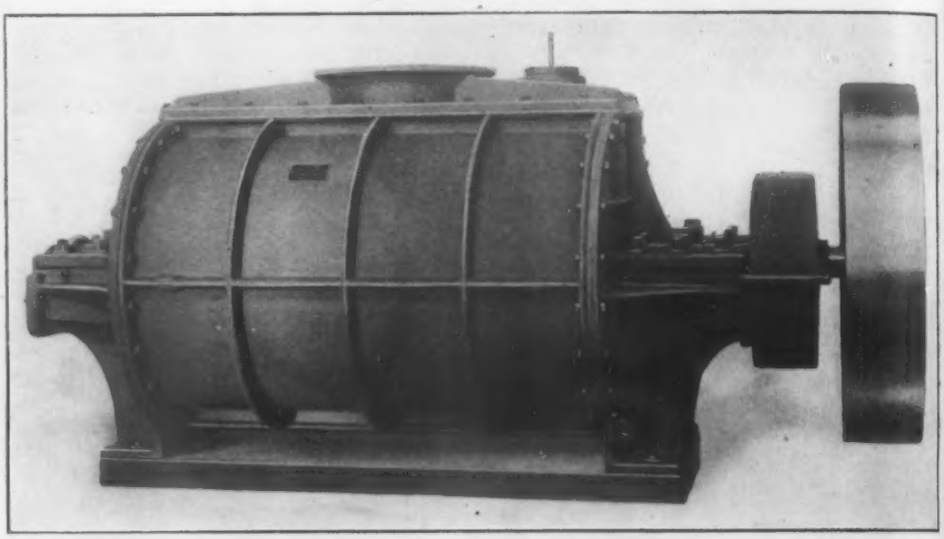


Fig. 2.—Interior of the Morse Dust Collector.

The inner casing E of the collector is of steel and readily renewable. The axial air escape and the vacuum principle reduce wear inside the collector to a minimum. Grinding action of material against the walls is avoided. The greatest suction is at the center of the whirl, which is the axis of the casing. The outer areas being rarefied act as cushions for receiving the centrifugally expelled dust, thus greatly reducing casing friction.

Connersville Rotary Positive Blowers

After the coke and iron have been measured and weighed into a cupola the operator should have some accurate means of determining the amount of oxygen supplied. In this respect a positive blower is most advantageous, for it discharges a known volume of air per revolution and can be speeded for the quantity of iron to be melted. The certainty and reliability with which melting proceeds also enable the foundryman to know the time required for certain heats and thus make a saving in labor. When the charges into a cupola are of fine material or the tuyeres become clogged, the resistance is increased and the amount of air entering the furnace diminished unless a positive blower is used. With the latter running at a constant speed there is a constant volume of air forced into the cupola, regardless of changing resistance and thus the melting is not retarded. Rotary blowers now in operation on foundry cupolas have had the pressure during a heat go up from 10 to 24 oz., and the melting proceed at a constant rate.



A Rotary Positive Blower for Foundry Use (Horizontal Type S. F.) Made by the Connersville Blower Company, Connersville, Ind.

The illustration shows a positive pressure rotary blower built by the Connersville Blower Company, Connersville, Ind. It is equipped with the company's quarter box ring oiling adjustable bearings, and is designed especially for foundry use. The ring oiling feature combined with rigidity permit its being run at much higher speed than is customary with most rotary blowers built for this purpose, and at the same time not at a speed so high as to be objectionable from a standpoint of efficiency and noise.

The impellers do not touch each other nor the cylinders in which they revolve, but are made with as little clearance as possible. All the parts being well designed and made rigid enough to hold their exact shape and position when running under pressure, the clearance can be made very small. There are two impellers only, each cast in a single piece, strongly ribbed on the inside and planed all over. The contact surfaces are formed on mathematically correct lines and finished accurately with two cuts. This construction permits the impellers to revolve together with uniform clearance. There are no waste spaces or pockets between these impellers and no sharp corners or edges on them to produce sound vibrations. The impellers being symmetrical with respect to the shaft centers are balanced at all speeds.

CLEANING EQUIPMENT

Drucklieb Sand Blast Specialties

The Drucklieb sand blast specialties herewith illustrated comprise the injector sand blast apparatus and a sand blast tumbling barrel.

The sand blast apparatus, shown in Fig. 1, has proved itself durable and effective, working either under high or low air pressures. Designed to take advantage of the well-known injector principle, the air supply is so subdivided and controlled by one operation of a three-way cock that it draws the sand evenly from the sand tank, mixes it and then forces it out of the mixing chamber, thoroughly incorporated with the air at its maximum velocity. All mixing of air and sand is done in the mixing chamber and not in the hose, which simply acts as

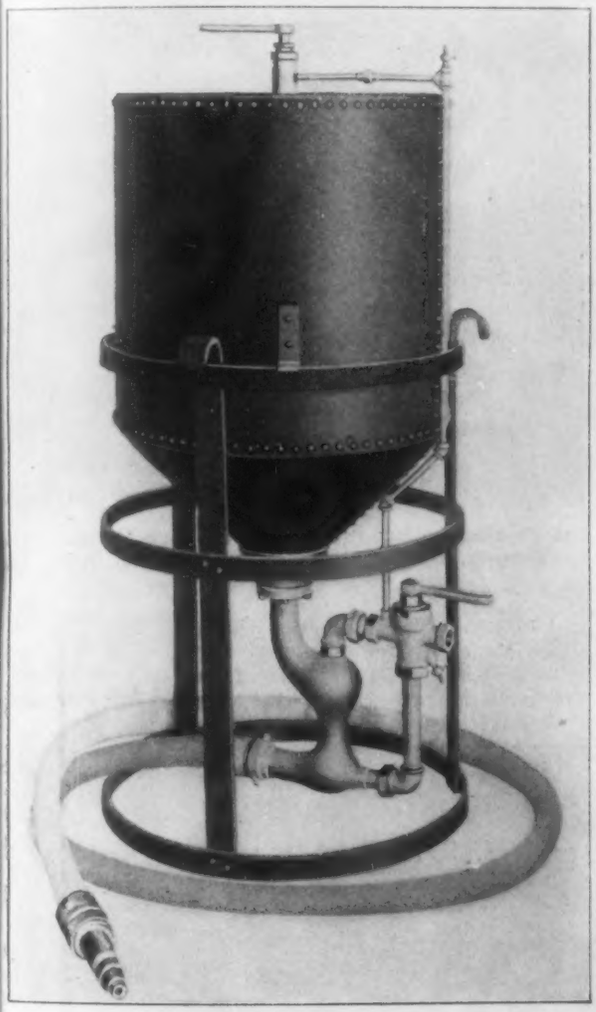


Fig. 1.—The Drucklieb Injector Sand Blast Made by J. M. Betton, New York.

the conduit through which the abrasive mixture is conveyed to the work. In the foundry, all kinds of castings are thoroughly cleaned in the quickest possible time, the air pressure being varied to suit the work in hand. In the shop, sheet steel is cleaned, all scale, rust, dirt and grease being entirely removed in preparing for enameling, japanning, galvanizing, &c. Many of these machines have been used for cleaning steel bridges and other steel structures, as well as stone and brick work, and for surfacing concrete structures. The Drucklieb injector sand blast apparatus is made and sold by J. M. Betton, 178 Washington street, New York City.

In the Ohio sand blast tumbling barrel, shown in Fig. 2, all bearings and trunnions are placed without the housing, away from the action of dust and sand. All wearing parts are designed to be easily and inexpensively renewed in the shortest time, without dismantling the barrel, and all trunnions and bearings are so mounted that there can be no warping or spreading. The barrel

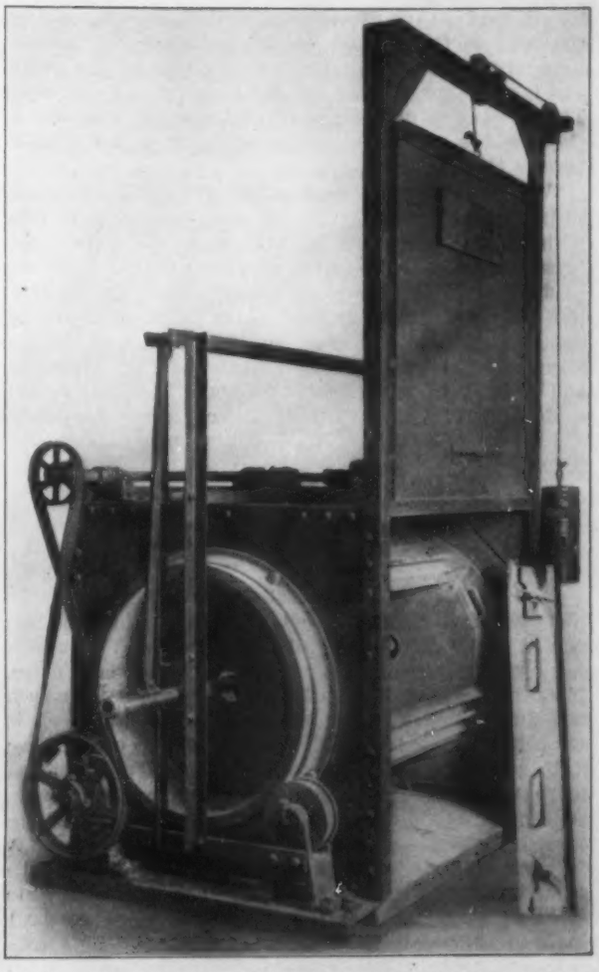


Fig. 2.—The Ohio Sand Blast Tumbling Barrel Made by J. M. Betton and the J. D. Smith Foundry Supply Company, Cleveland, Ohio.

rests on four trunnions, and is revolved by power, slowly, only three revolutions per minute being required to clean all the surfaces of its contents by the sand blast, and not by friction or tumbling.

The blast is led into the barrel at each end through two horizontal pipes, as shown in Fig. 3, which are swung constantly by power, across the line of revolution of the barrel, a sufficient number of times to remove all sand and scale from the castings. These nozzles are connected to a Drucklieb injector sand blast and are operated preferably under low air pressures, from which excellent results are obtained.

The barrel is made of two end castings, to which are

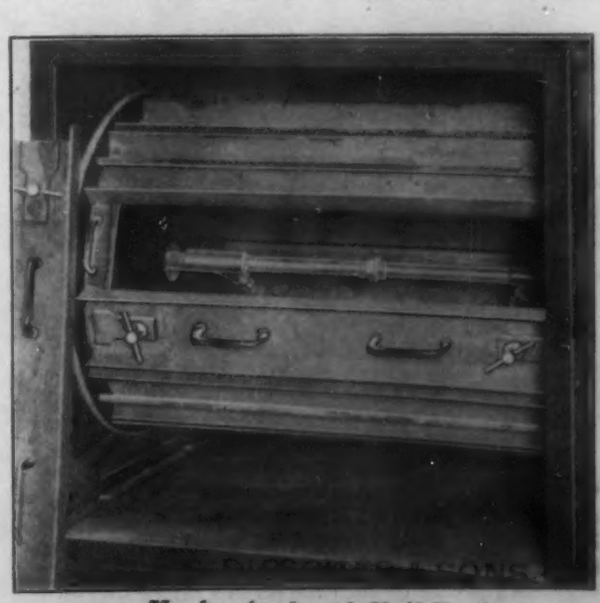


Fig. 3.—Interior of Ohio Sand Blast Tumbling Barrel, Showing the Drucklieb Sand Blast Nozzles.

bolted steel staves of standard shapes, spaced to allow the sand to fall through to the bottom of the housing. Four trunnions with roller bearings support the barrel and insure easy running and the least friction and wear. The housing is of sheet steel and suitable provision is made at the rear for a connection to an exhaust fan to remove the dust.

With this barrel, brass castings of difficult design and coring, to the amount of 250 lb., were cleaned in 10 min. with air pressures from 20 down to 10 lbs. Their surfaces, angles and edges were uninjured, and it could not be determined by careful examination whether the castings had been cleaned in bulk in the barrel or singly, by hand. Gray iron and crucible steel castings of various forms were cleaned in 15 min. under low air pressures, and with very satisfactory results. The barrels are made in several sizes by J. M. Betton, above mentioned, and the J. D. Smith Foundry Supply Company, Cleveland, Ohio.

Superior Tumbling Mills

The Superior steel exhaust tumbling mills made by the Cleveland Nickel Works, Cleveland, Ohio, are arranged to be quickly opened and closed, and require a comparatively small amount of power for their drive. The accompanying illustration shows two mills, one open and the other closed. It will be seen that the journals are bolted to the mill heads and are not one piece, hence it is not necessary to take out the head to replace a journal. Babbitted self-oiling bearings are used, and all shafts have split couplings. The stands are cast in one piece and the shifting lugs are bolted to the leg. A dust box is provided with a packed joint, which is self-adjusting for wear of the journal. The steel dust plate attached to the head is the full size of the head. All parts are interchangeable, and an automatic sand trap is provided. The covers of all round mills are made to fit the opening and to be flush on the inside of the mill, while a steel strap frame attached to the barrel covers the joint. This construction allows the doors to be made very light and hence easily handled. Square mills are arranged so that they can be loaded from either side. The company makes a very wide range of sizes and styles of mills suitable for all kinds of tumbling work.

Another product interesting in this connection is the Glassford dust arrester, which consists of a wooden case and a battery of rotary screens attached on a horizontal hollow square shaft mounted on journals at each end, one journal being open and the other closed. The fan exhausts the case through the screens through which the dust cannot follow, but remaining in the case can be emptied out at convenient intervals. The dust is shaken down from the screens as they rotate by pivoted hammers, which are tripped by projections on the periphery of the screens.

The Superior cinder mill is another product of the Cleveland Nickel Works, and is used for reclaiming iron and coke from cupola cinder. It grinds the cinder and separates the coke and iron from the dirt in one operation.

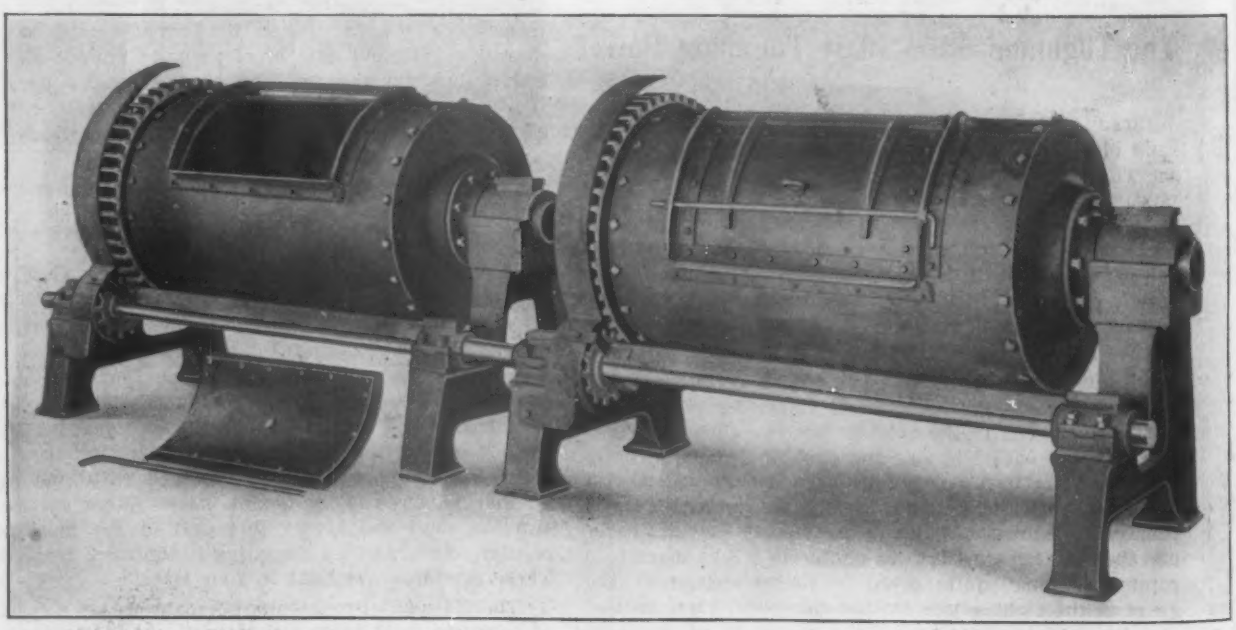
The Sly Tumbling Mills

Proper equipment in the cleaning room is as essential as in any other part of a foundry for economical operation. The W. W. Sly Mfg. Company, Cleveland, Ohio, specializes in the making of cleaning mill equipment,

Fig. 1.—Tumbling Mill Equipment in the Globe Malleable Iron Company, Syracuse, N. Y., Installed by the W. W. Sly Mfg. Company, Cleveland, Ohio.

and furnished the installation shown in Fig. 1 at the Globe Malleable Iron Company, Syracuse, N. Y. The mills are designed so that none of the cast iron parts of the barrel are exposed to wear. The shells are made of flanged steel and all parts are machined to template and designed and constructed for durability and effectiveness.

The dust and dirt from the mills is exhausted through a dust arrester, where it is retained and does not reach the exhaust fan. The latter is thereby saved from the



Two Superior Steel Exhaust Tumbling Mills Made by the Cleveland Nickel Works, Cleveland, Ohio.

cutting action of the dust, otherwise its blades would soon be worn away. Prevention of the escape of dust not only means a cleaner plant, but the protection of all the machinery in the plant. The case of this arrester is of heavy steel made weatherproof, and can be placed anywhere out of doors—on the roof of a building, or

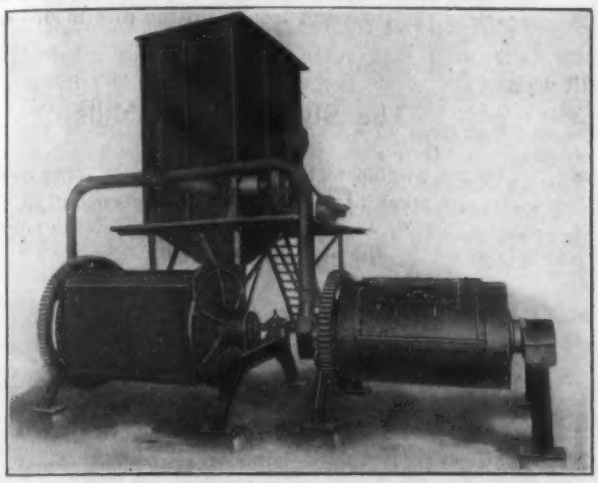


Fig. 2.—Typical Arrangement of Two Sly Mills Piped to a Dust Arrester.

wherever convenient. The dust remains in the arrester until it is withdrawn through the hopper at the bottom. Fig. 2 shows a typical arrangement of two mills properly piped to a dust arrester.

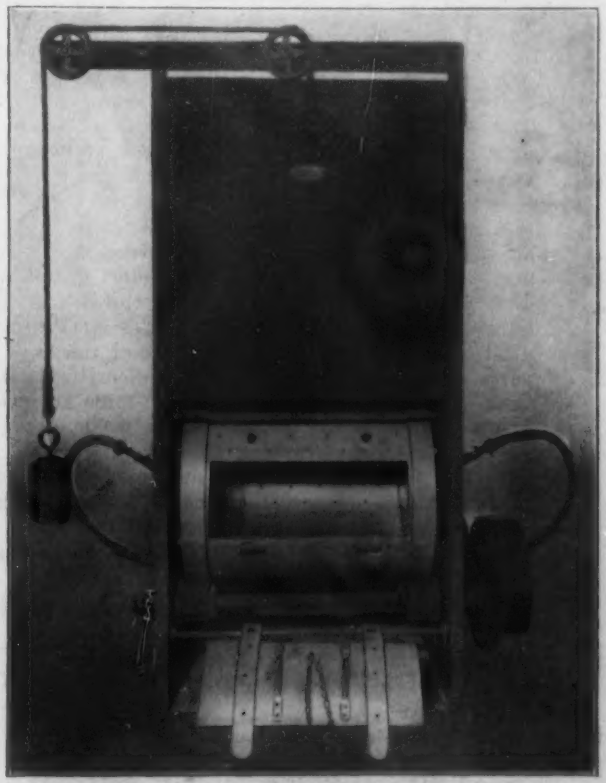
One of the great losses in a foundry is the refuse from the cupola drop and gangway scrapings. Attempts to pick the largest pieces of iron out by hand and sieve the balance recover considerable, but there is still a large waste. The Sly cinder mill, another of the products of this company, makes it possible to recover all of the iron from the cupola drop. The dump is loaded into the mill and a centrifugal pump circulates water through the mill washing out the coke and dirt, leaving the iron behind. This residue is ready to go back into the cupola, and will make as good castings as sprue scrap and better than machinery scrap. The coke which is recovered can be used in core ovens, base burners, &c.

The Tilghman Sand Blast Tumbling Barrel

Study of the most suitable air pressures for use with sand blast apparatus has been prominent in the work of the Tilghman-Brooksbank Sand Blast Company, Philadelphia, Pa. In general its experience has indicated that low or moderate pressures are more economical than high pressures both in the service of the sand blast equipment itself and in the labor cost. The actual pressure found best to use in given cases depends upon the nature of the work treated. Generally from 10 to 20 lb. is the range of pressure recommended by this company for cleaning castings and forgings. The company has also given considerable attention to the designing and adapting of sand blast machinery to special requirements.

One of the Tilghman products particularly of interest to foundrymen is the sand blast tumbling barrel. The illustration shows it with the door raised and the cover off the barrel, exposing the interior. The barrel is rotated by small rolls keyed to shafts, driven by the gears at the right of the casing. The sand blast nozzles are attached to the sides of the casing at an angle to distribute the blast over the contents of the barrel, and play through openings at the centers of the heads of the barrel. As the barrel slowly revolves, 3 or 4 rev. per min., all the different faces and angles of the articles within it are exposed to the action of the blast, and the molding sand and other foreign substances adhering to them are completely removed, even from the sharp angles and cores of small castings. The slow rotation of the barrel prevents injury to sharp edges of articles and very much reduces the breakage. No stars, jacks or shot are required, and under the action of the blast the work is done in less than half the time necessary with an ordinary tumbling barrel. The barrel is perforated to permit the spent sand, the core and molding sand and the scale removed from the work to fall through into a receptacle beneath.

In the top of the casing is an opening to admit air into the barrel. This air, bearing the dust generated by the operation, is drawn downward by an exhaust and deposited in a receptacle provided for the purpose. Behind the barrel, so that it does not appear in the illustration, is a sand blast machine, to which the two nozzles are connected by rubber hose. Often for continuous operation another barrel is placed on the other side of the machine, with its back to it, so that while one is in operation the other can be unloaded and recharged. The only interruption is the brief time necessary to remove the nozzles from one barrel and insert them in the other. The barrels are built in three sizes, 30 in. in diameter by



The Sand Blast Tumbling Barrel Made by the Tilghman-Brooksbank Sand Blast Company, Philadelphia, Pa.

24 in. long, 30 in. in diameter by 36 in. long and 36 in. in diameter by 42 in. long. Other sizes are built to order.

The sand blast machine is the regular one furnished for general sand blasting, and is cylindrical in form, with upper and lower chambers. Through the upper one by the manipulation of sand valves new charges of sand can be introduced without cutting off the supply of air to the lower part from which the sand is discharged. In the lower chamber the sand is mixed with compressed air and delivered to the flexible hose. Other valves control the sand and air in this part of the machine to regulate the quantities according to the work being done. These machines are built in four sizes.

The Tilghman-Brooksbank Company makes a specialty of complete sand blast plants with automatic sand elevator and dust separator, air washer and ventilating fan. This provides for the automatic separation of the spoiled sand and dust from the good sand and the prevention of the escape of sand and dust about the works, where it might be a nuisance and positive menace to machinery, and also makes the conditions under which the operator works more comfortable and safe.

The Kelly High Pressure Sand Blast

An extended description of the Kelly high pressure sand blast machine and nozzle made by the High Pressure Sand Blast Company, 20 Broad street, New York City, was given in *The Iron Age*, February 10, 1910, so that it suffices at this time to recite briefly their more important features. Those of the machine are a slotted baffle plate at the intake which arrests moisture in the air insuring a supply of dry air; a cock at the bottom of the tank through which the condensation may be drawn; an accumulating tank in the lower section of the machine so that when it is operated at some distance from

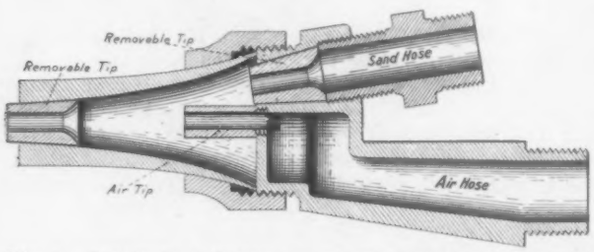


Fig. 1.—Longitudinal Section of the Kelly Sand Blast Nozzle Made by the High Pressure Sand Blast Company, New York.

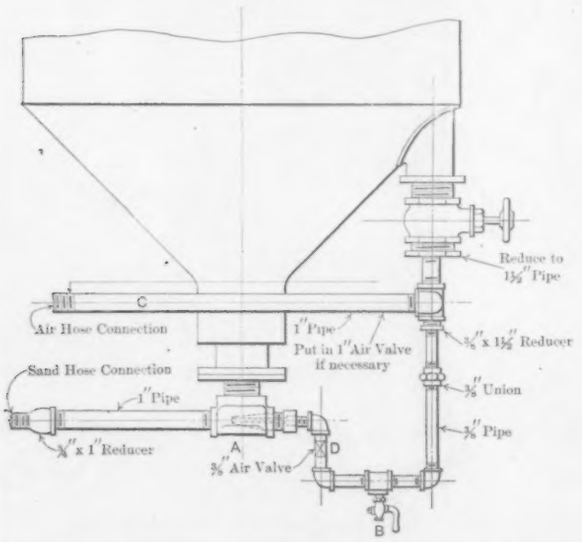


Fig. 2.—A Low-Pressure Sand Blast Machine Adapted to the Kelly High Pressure System.

the compressor or accumulating tanks a reserve volume is furnished close to the work; perfect control of the flow of the sand by the air jet, eliminating wear from the machine proper and insuring a steady supply of sand with the least possible air; the sand being carried by one line at a low velocity to the nozzle, reducing wear on the hose; and means of carrying full pressure of air to the nozzle with the least loss from friction, attendant upon propelling sand and air at a high velocity through a single line. The features of the Kelly nozzle, a section of which is shown in Fig. 1, are that it can only consume a given volume of air at a given pressure, regardless of the enlargement of the tip by sand erosion; that the wear of the sand is taken up by removable tips of negligible cost; that the body of the nozzle is protected from wear by the removable tip, and that it gives uniform nozzle pressure. It is claimed that the nozzle gives the highest efficiency at the lowest cost of air and sand. The nozzle is adaptable to old style single hose systems.

Fig. 2 shows how a low pressure machine of other make may be converted to the Kelly system. After removing the entire elbow from under the machine, a flange connection of steel plate is substituted, having pipe connections for a ⅛-in. Kelly ejector, indicated at A in the engraving, a ¾-in. sand hose, and a 1-in. air hose. The cock B serves to blow out condensation, and should always be opened when starting operation to allow moisture to escape and to keep it out of the sand hose. The free ends of the two hoses are connected to the Kelly nozzle. The Kelly ejector will reduce the amount of air used through the sand hose and may be regulated by the ⅜-in. cock D, and will also reduce the wear and tear on the hose. This cock will do better service if attached at E instead of as in Fig. 2, as it will permit all moisture to be drained before air is admitted to the sand hose.

The removable tip at the sand hose connection will last about 15 to 20 hours, according to the pressure used and the sharpness of the sand. Proper care should be taken to remove this tip when worn. Otherwise the sand will destroy the nozzle proper which should last indefinitely, and too much sand will get in the cone. The end tips will last from 45 min. to 1 hour, according to the pressure used. Care should be taken to screen the sand through a 10-mesh sieve. This will prevent any pebbles or foreign matter from clogging the nozzle. The aperture of the sand tip being only ¼ in., is easily clogged by a pebble or bagging or some such substance.

PNEUMATIC TOOLS

Pittsburgh Chipping Hammers

Being of shorter stroke and consequently much higher speed than a valved hammer of corresponding power, the chipping hammers made by the Pittsburgh Pneumatic Company, Canton, Ohio, are considered to be particularly well adapted for foundry work. It has been found in foundries that the sand wears the ferrule very rapidly where the chisel shank enters. This in a valved hammer results in a loose fitting chisel, and consequent loss of air, which detracts from the efficiency of the hammer. In the Pittsburgh hammer, since live air is never admitted to the forward end of the piston for return, the chamber at the forward end being open to the atmosphere, any leak around the shank

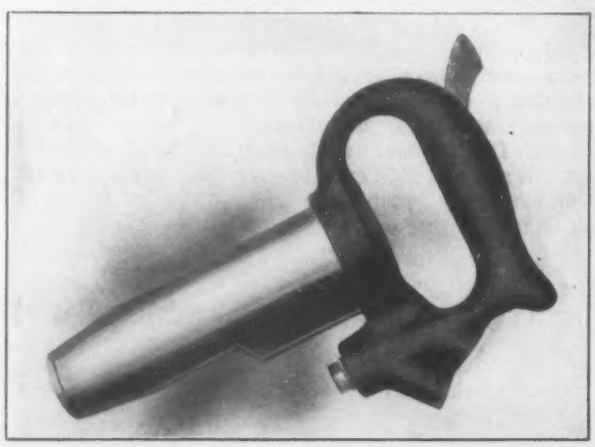


Fig. 1.—The Chipping Hammer Made by the Pittsburgh Pneumatic Company, Canton, Ohio.

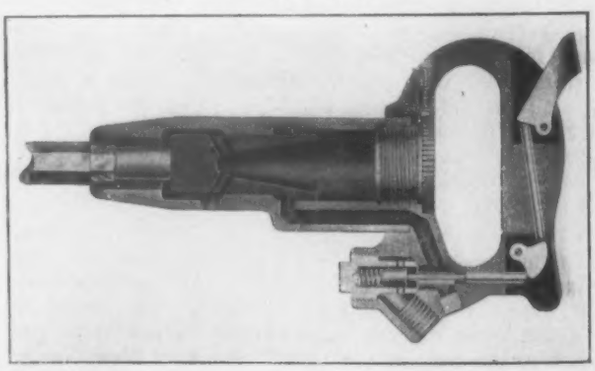


Fig. 2.—Sectional View of the Pittsburgh Chipping Hammer.

of the chisel will not alter the efficiency of the hammer.

Fig. 1 shows the exterior of the hammer and Fig. 2 a sectional view. It will be seen from the latter that the hammer is valveless in the sense that the piston is

itself the valve. In the position shown, the piston has just made a forward stroke, and is about to be returned by the pressure of air against the shoulder of the enlarged diameter of the piston reacting against the close-fitting cylinder around the smaller diameter of the piston. When the piston returns the ports in its forward end register with the air inlet, and the air flows through the piston to the rear chamber, driving the piston forward again. The air is cut off at about one-quarter stroke and acts expansively the remainder of the stroke, which economizes the air consumption. When the piston passes into the enlarged chamber at the front of the hammer body the air is exhausted through the port on the under side of the barrel.

The hammer has only one moving part and its air control mechanism is equally simple. It is a matter of but a few moments to take the hammer completely to pieces by unscrewing the head at the handle end of the barrel. The piston on its return stroke is not stopped by the sudden admission of compressed air, but is cushioned by the air pocketed after the ports in the piston leave the exhaust space. This considerably reduces the vibration. The hammers have drop forged steel handles and hardened and ground steel cylinders. They are made in 10 sizes, weighing from 6½ to 12¼ lb.

Cleveland Pneumatic Hammers and Rammers

The Cleveland Pneumatic Tool Company, Cleveland, Ohio, has added to its line of pneumatic hammers a chipping hammer especially designed for steel casting work.

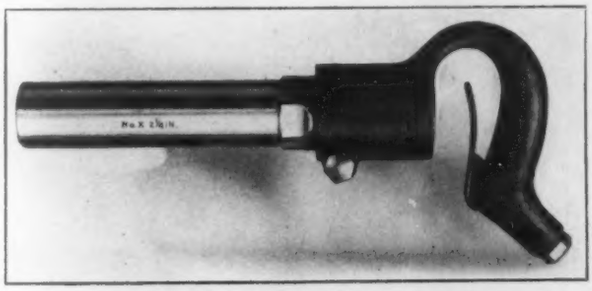


Fig. 1.—A Steel Casting Chipping Hammer Made by the Cleveland Pneumatic Tool Company, Cleveland, Ohio.

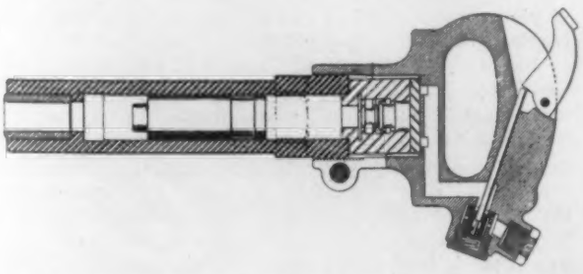


Fig. 2.—Sectional View of the Cleveland Steel Casting Chipping Hammer.

It is made with both an inside and outside throttle lever. The main cylinder of the hammer is exceptionally heavy for this severe work, and all other parts are in proportion. Fig. 1 shows an exterior view of the inner latch hammer, and Fig. 2 a sectional view of the outer latch hammer.

The controlling valve is a two-stage type, giving a graduated opening and permits delicate control. When the main throttle lever is partially depressed a small amount of air is admitted to the main valve, and when further depressed the full supply is gradually admitted. The piston does not travel through the main valve, the valve being placed at the rear of and in line with the piston. Upon the return stroke of the piston a leakage of live air is allowed, upon which the piston cushions. This cushion also throws the valve, reversing the motion of the piston. On its forward motion a certain clearance is left for the piston beyond its normal stroke. If this extra stroke is exceeded, the piston closes off the supply ports and stops. This prevents the piston striking the forward end of the hammer barrel and in time crystallizing it. When the material chipped is very hard, the recoil of the hammer is great and it is difficult to keep the hammer against the chisel or working tool. Then, unless the air is cut off by the piston at its forward stroke, the piston will strike the nose end of the hammer and in time break it off.

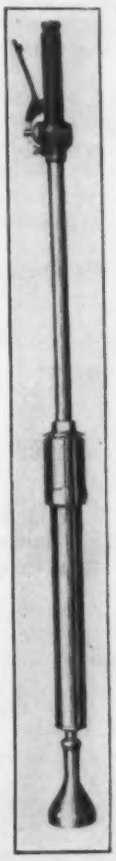


Fig. 3.

Fig. 4.

Exterior and Sectional Views of the Cleveland Pneumatic Rammer.

The Cleveland steel casting chipping hammers are made in six sizes, ranging from 1¼ to 5 in. stroke. The general specifications are similar to those of this company's line of chipping, caulking and beading hammers. The outside latch handle is drop forged carbon steel, heat treated, and the inside latch handle is a steel casting of high tensile strength. The throttle valve is of air balanced type, and the main valve is of tool steel, the solid type, hardened and ground. The plunger is of special tool steel; also hardened and ground. All parts are interchangeable.

Another new product of the Cleveland Pneumatic Tool Company is a foundry sand rammer and concrete tamper, of which Fig. 3 shows the exterior and Fig. 4 a cross section. The action of the rammer and some of the features of its construction are similar to those of the chipping hammer. If the operator should not hold the rammer in proper position for tamping and should allow too great a stroke of the piston, the latter is prevented as before from coming in contact with the forward end of the barrel. The piston bearings are so arranged that any dirt or grit getting on the piston rod is wiped off and not carried into the piston chamber. These machines are made in sizes suited to all classes of work.

Chicago Pneumatic Sand Rammers

Some months ago the Chicago Pneumatic Tool Company, Chicago, Ill., introduced a specially constructed sand rammer, operated by air, for putting up steel ingot molds, which had hitherto been done by hand. These ingot mold rammers have now been adopted, and are in extensive use at the works of the Illinois Steel Company, at the Cambria Steel Company's plants, and elsewhere for this class of work, and experience has demonstrated their economy, rapidity and the excellence of the work produced.

These rammers are made on the same basic principles as the company's other tools of this nature, but have special features added not necessary in the regular rammers for floor and pit work. In all the sand rammers, the matter of rapid wear has been given special attention, in the selection of most suitable material to withstand

the rough usage unavoidable in a foundry. For instance, extended use has demonstrated that a cast iron lining in the cylinder of such a tool is preferable to one of hardened steel, with the added advantage that when it is so worn as to impair the efficiency of the tool, it may be reamed and fitted with an oversize piston, so prolonging the life of the tool materially.

In the matter of design, the conditions under which the tools must work have been considered, and the wearing parts so made as to be quickly and economically removed and replaced. The packing has this desirable feature, and the valve is easy of access and so constructed that it will withstand excessive wear without impairing its efficiency.

Protection is provided to the working parts of these rammers to exclude dirt and dust.

PATTERN SHOP EQUIPMENT

Gardner Patternmaker's Disk Grinder

The patternmaker's disk grinder, manufactured by the Gardner Machine Company, Beloit, Wis., has a number of features which make it as effective a tool in wood-

Fig. 1.—Patternmaker's Disk Grinder.

working as the disk grinder has long been in metal work. The universal work table, as shown in Fig. 1, is one of these. It may be tilted at any angle with the face of the wheel, and one turn of a hand nut locks it in the required position. The design of the axis bearing or tilting axis is such that the inside edge of the work table remains close to the face of the wheel, regardless of its angular or lateral position. The table is counterbalanced by a weight within the base of the machine, connected by a steel cable passing over a grooved pulley at the top. Included in the equipment of the No. 17 machine, which is shown, are the work table, universal angle gauge, circular core print gauge, dust hood and countershaft. The spindle pulley is 10 in. diameter by 5 in. face. A 5 hp. drive is sufficient for all requirements, the speed of the wheel being 6000 ft. per minute. The trimmer can be practically dispensed with, and the grinder also does much lathe, bandsaw, jointer and drum sander work, besides reducing the amount of hand planing, carving and sanding knots, cross grains, end

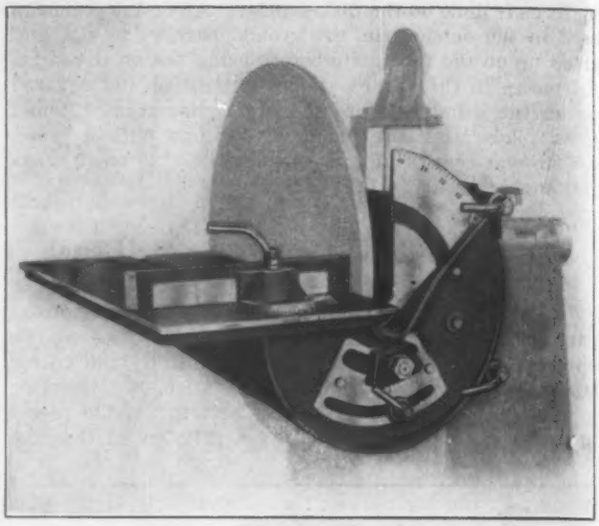


Fig. 2.—End View Showing Universal Angle Gauge.

grains and projecting nails and screws are worked without difficulty.

The universal angle gauge or protractor head is of great convenience in squaring pieces and producing angles and draft. For the preparation of segments the universal duplicating gauge is employed. An example of its work is given in Fig. 3. The pattern is 52 in. in diameter, each segment being 17 in. long. By tilting the work table and using the duplicating gauge each of the

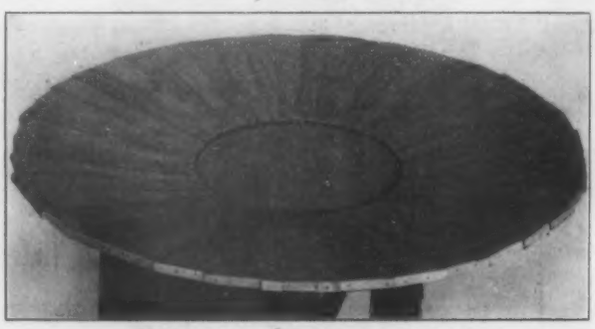


Fig. 3.—Concaved Plate Pattern Made Up of Tapered Segments.

44 pieces was accurately beveled on the sides, this being required because of the concavity.

Fig. 4 illustrates the production of gear teeth. The blocks 8 in. long by 2½ in. wide by 3 in. high, were first made parallel on the universal duplicating gauge and then squared up on end by using the universal angle gauge. A simple wooden fixture was made for holding the blocks. By using the circular core print gauge, with the pin at the proper radius, this fixture with the block in place was swung against the wheel, the work table was tilted ½ degree to produce the required draft. The stop screw made it possible to make the 96 gear teeth exact duplicates. It is estimated that the time was one-tenth of that required by the old method. In some shops the majority of the machine work on large gear

Fig. 4.—Producing the Curve of Gear Teeth.

patterns is done on the disk grinder. All of the segments used in the outside rim are ground parallel to size and glued up on the face plate before being put on the lathe. All pieces in the spokes are made parallel and squared up on the grinder before the gluing operation. Round hubs, plates and core prints are ground with a taper, the circular core print gauge being used. All wood fillets and angles were also fitted on the grinder.

The Oliver New Universal Saw Bench

An accurate and adaptable saw bench is an important part in the equipment of a pattern shop. The No. 60 universal double arbor saw bench, built by the Oliver Machinery Company, Grand Rapids, Mich, is interesting in this connection on account of certain notable recent improvements. Fig. 1 shows a general view of this tool

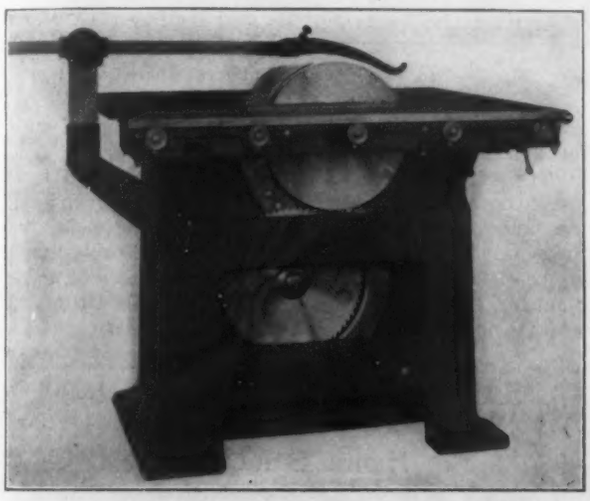


Fig. 1.—The Improved No. 60 Universal Saw Bench Built by the Oliver Machinery Company, Grand Rapids, Mich.

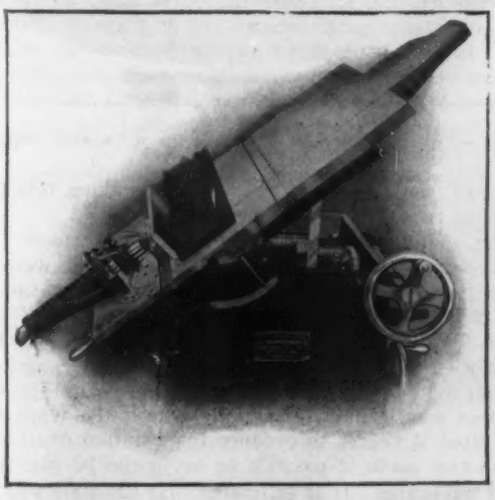


Fig. 2.—The Table Tilted to 45 Degrees and the Universal Ripping Gauge in Use at the Left of the Saw.

in its most commonly used position, and the two saw arbors, one carrying a rip saw and the other a crosscut saw. Both arbors are located upon a swinging yoke, which will bring either saw in operation even while the machine is in full motion. This arrangement and the tilting table make it impossible to apply the ordinary safeguards, but the safety features now installed are effective and unique.

In the rear of each saw is a steel blade conforming with the periphery of the saw and serving as a splitter, doing away with chance of the work jumping back, due to the teeth coming in contact with the work after it has been ripped. The saw guard proper is mounted upon a steel rod, held by an eccentric lever clutch over a saw splitter that in turn is held rigidly at the rear of the main column of the machine, making the saw guard independent of the tilting of the table. The eccentric lever clutch provides easy adjustment of the guard over the saw, as the saw is vertically adjusted for depth of cut.

The machine itself has been thoroughly redesigned. The main column is divided by a cast iron partition, which receives the front disk bearing of the swinging

Fig. 3.—View Showing the Face of the Table and the Use of Cut-off Gauges in Sawing Compound Angles.

yoke, and also prevents sawdust from getting into the mechanism. The rolling section of the table is now carried on two sets of large frictionless rolls, all located on a subbase, which is adjustable for keeping the rolling section of the table in line with the solid section. This provides a constant distance from the center of each roller to the base of the rolling table and makes it easy to operate the table. The table is tilted by an entirely inclosed self-locking worm and worm gear device. The rocker seat of the table is solid with the main column, and is bored in line with the main bearings of the swinging yoke. Both the rocker and rocker caps are machined.

The swinging yoke has undergone some radical changes. The self-locking worm and worm gear device for revolving it has been moved to the outside of the main column, allowing easy access to the bearings. The worm gear is fastened to the rear of the swinging yoke by a large cap screw with fine threads for adjustment. The saw arbors are ground on Brown & Sharpe grinders, and have fiber washers to give double frictional surface for end motion; all end play is taken by large threaded collars. All bearings are of the capillary self-oiling

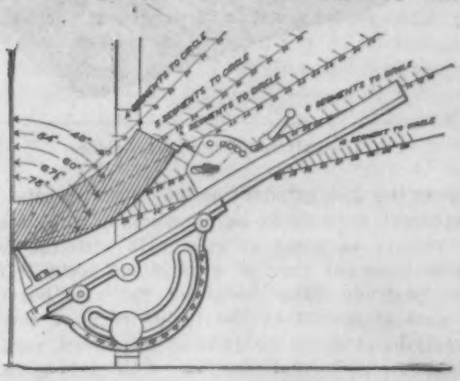


Fig. 4.—Diagram of the Use of the Gauge for Sawing Segments.

type, with oil wells and brass oil cups. The idler pulleys are now rigidly fastened upon machine ground shafts, which run in self-lubricating bearings.

The ripping gauge has been made entirely universal and can be located at either side of the saw. Its position on the left-hand side is illustrated in Fig. 2. The ripping fence tilts down to 45 degrees, and is adjustable to and from the operator so that its relative position to the saw may be kept constant, whether the saw is toward the

front or the rear of the table. The gauge may be set at any angle to the saw, which is especially desired for making large core boxes, is located on the table by tapered pins and secured by a hand clamping knob, and may be moved across the table quickly by hand or set accurately by a micrometer adjustment.

Fig. 3 shows the table tilted and the universal gauges located for cutting compound angles, such as for hopper boxes. The two universal gauges regularly furnished have graduations showing the exact angular relation to the saw line. These may be operated in the grooves on the table at either side of the saw, and when not used the grooves may be filled by steel strips. Universal gauges are useful for many operations, among others inside and outside miter cutting at one handling of the material. The top of the table is graduated across its main portion to act as a gauge in determining width of cut, and on an arc on the rolling part so that the miter cut-off gauge may be set at any angle to the saw from 30 to 135 degrees. Eight important positions of this gauge are located by pins in tapered holes. When the machine is so ordered it is also graduated in the main part for cutting segmental work. This graduation and segment cut-off gauge is illustrated in Fig. 4. By its use four to twelve segments may be cut for circles from 10 to 105 in. in diameter.

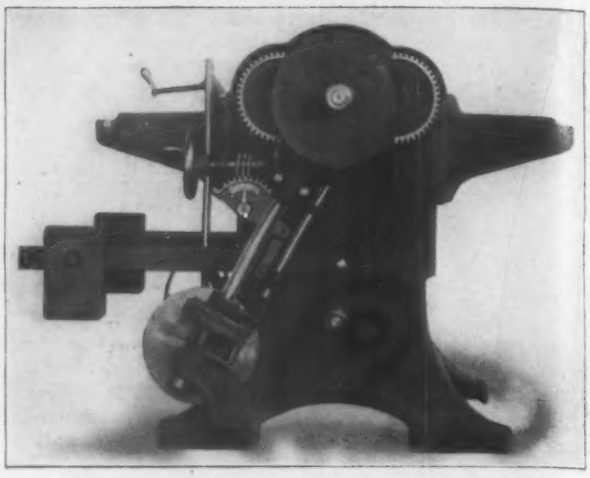
This machine may be driven either by a countershaft placed on or below the floor, or by an individual motor placed on a bracket bolted to the frame of the machine. As manufactured to-day the machine is in every way universal. Using the gauges either straight or angular ripping may be done up to 24 in. wide, and either straight or angular cross cutting up to 36 in. wide. Any compound angles may be cut. Core boxes may be made by setting the ripping gauge at an angle. Either straight or angular dado work up to 4¼ in. may be easily accomplished. Light moldings up to 2 in. wide may be produced by the use of a cutter head. Column jointing and dovetail fitting, corner locking, panel raising, spiral grooving to produce worms, bevel and miter cutting and many other important operations are easily accomplished. It is really a combination of four machines in one.

Crescent Variable Feed Planer

In the line of woodworking machinery made by the Crescent Machine Company, Leetonia, Ohio, a machine of considerable utility in the pattern shop is the planer here illustrated. The new feature of this planer is the provision of a variable friction feed driven direct by belt from the head. By turning the hand wheel shown the changes can be readily made while the machine is running. The slowest speed is 12 lineal feet per minute and the fastest 50 ft. per minute. A pointer or scale indicates the feed being used. When ordinary work is being done a few turns of the hand wheel will give a fast feed and a marked saving of time will result, and when extremely smooth work is desired a few turns of the hand wheel in the opposite direction will give a slow feed and the work produced will be of the desired smoothness. When the rough lumber to be surfaced is not uniform in thickness there is an advantage in using a slow feed for the thicker pieces. Thus it is not necessary to shut down the machine until the belts begin to slip. The feed is varied according to the thickness of the cut being taken and the width of board being passed through.

A throw-off lever at the side of the table can be used for stopping the feed entirely without stopping the machine. The front upper roll is hung with weights. In other respects these planers are similar to the regular line built by this company.

Two sizes of the variable feed planer are built, Nos. 218 and 224, respectively. The first will plane 17¾ in. wide by 6 in. thick, the second 23¾ in. wide by 6 in. thick. The floor spaces occupied are 44 x 43 in. and 44 x 49 in., and the weights 1400 and 1500 lb., respectively. It will be noticed from the illustration that the machine is especially compact, which is a point of considerable importance in a machine to be installed in a pattern



A Wood Planer with Variable Feed Built by the Crescent Machine Company, Leetonia, Ohio.

shop. Strength is contributed to by the fact that the machine is cast in one piece and the bed is gibbed directly to the body of the frame. This construction, being easily adjusted, prevents the bed from rocking and avoids clipping the ends of the lumber. The chip breaker and pressure bar are placed as close to the knives as clearance will allow, so that extremely short stock may be worked. The head is milled from a solid bar of steel, is carefully balanced and carries two knives.

SAND TREATING EQUIPMENT

Hanna Sand Sifters

Quite an extensive line of power sand screening equipment is made by the Hanna Engineering Works, 2095 Elston avenue, Chicago, Ill. The sand shakers even when as large as that shown in Fig. 1 are easily portable and the revolving riddle, of which one is shown in Fig. 2, can be mounted on wheels if desired. Portability is an advantage, since it enables screening to be done at the mold, saving the expense of wheeling the sand to and from a stationary screening equipment.

The screen box of the large pneumatic tripod shaker is 2 ft. wide by 3 ft. long, is entirely of steel, and can be fitted with screens of any mesh. The changing of screens

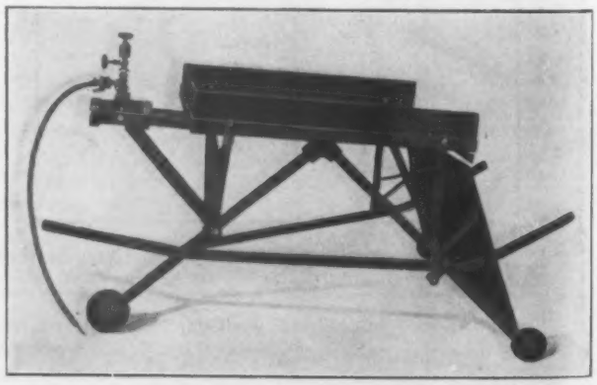


Fig. 1.—A Large Tripod Shaker Made by the Hanna Engineering Works, Chicago, Ill.

is accomplished by removing a single nut at the end of the piston rod. The box is slightly inclined, with the lower end open, so that the discard is continuously discharged over the sheet iron apron at the end. The uprights of this box are arranged so that the incline of the screen may be adjusted to different angles to control the speed at which the material is discharged. The capacity of this shaker is about double that of the small Hanna tripod shaker, and the air consumption approximately 35 cu. ft. per minute. In malleable foundries the

machine is of advantage for screening annealing ore, as the large pieces which are used discharge freely over the end of the screen box and the fine stuff sifts through.

Smaller tripod shakers, not illustrated, are made, accommodating an ordinary 18-in. round foundry riddle, held in place by a steel band and quick clamping device, so that it may be removed instantly to dump out the rejection. The vibrating speed is controllable and the shaker will operate at any air pressure over 20 lb. At 80 lb. pressure, with the valve turned on full and the riddle loaded, approximately 25 cu. ft. of free air per minute is required. The machine is as useful in the coreroom as on the molding floor and may be moved about easily and freely. A similar shaker is made in post pattern, with a frame which can be fitted in sockets fastened to the posts or walls wherever screened sand is required. Frequently shakers of this type are operated by steam. A swivel post shaker is specially designed for bench work and molding machines. It swings on a vertical shaft held in brackets fastened to the wall or posts and is furnished with an automatic valve, which admits air to the cylinder for starting the machine as it swings into place over the flask and cuts off the air when swung back out of the way. The screen box is rectangular and screens of different mesh can be used, being easily interchangeable. It can be dumped clear of the coarse material by lifting one end off the frame while the other swings on two bolts. In operation the loose end of the box is held in place by a spring catch. This shaker is convenient for applying facing sand, the screen box containing enough sand for several molds, thereby avoiding the fatigue incident to lifting a full riddle above the flask for each mold when riddling by hand.

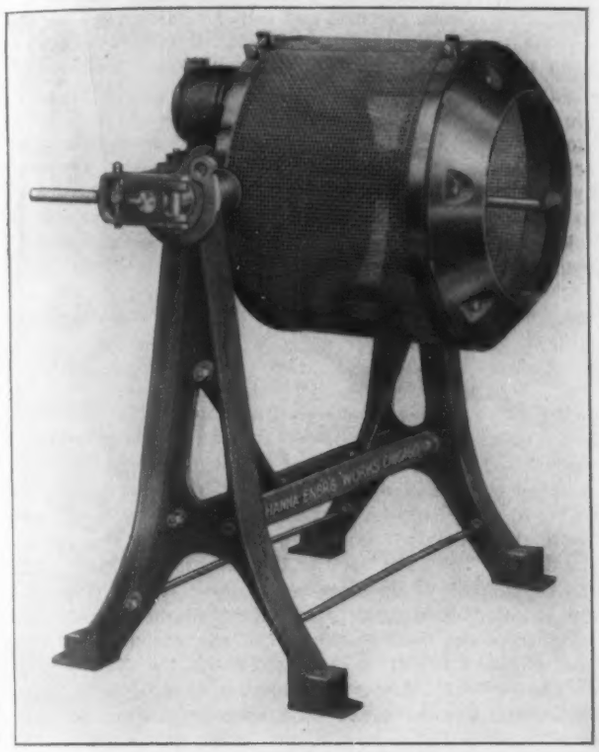


Fig. 2.—The Hanna Revolving and Dumping Riddle.

The revolving dumping riddle is especially adapted for screening and mixing heavy material and where difficulty is experienced in screening lumpy and sticky core sand. The placing of a few chunks of scrap in the barrel will materially aid in breaking up the lumps and keeping the meshes of the screen open. The barrel has a cast iron solid back head and open front head held by six rods inside of the barrel, protected from wear by pipe separators. It is 23½ in. in diameter and 18 in. long and is supported in the dumping bracket by a steel shaft. Heavy galvanized wire cloth is stretched over the barrel and the ends fastened together by metal belt lacing. The wire cloth is clamped in place by steel bands and is easily removed and replaced with one of another mesh by unbolting the band and slipping it over the front head. The drive is from a specially designed motor of either alternating or direct current type, geared directly to the screening barrel. The motor is mounted on the dumping bracket on which the screening barrel rotates and counterbalances the weight of the barrel, so that it is easily turned to dump the rejection, and swings back of itself to operating position. The machine is of advantage in the coreroom for mixing core sands with compounds, or screening rejections from the cupola, molding sand, &c.

Deane Sand Sifters

Sand sifting is a small item of foundry expense, nevertheless, a very considerable saving is possible by using an efficient mechanical sifter operated by compressed air, steam, belt or an electric motor. The Deane Steam Pump Company, Holyoke, Mass., has applied the principle of its single steam pump with certain modifications as required for the service in the sand sifter shown in Fig. 1. This is suitable for operation on compressed air or steam, and the construction of the valve mechanism is such as to give a quick, snappy reversal to the riddle at each end of the stroke. This makes it efficient, and accounts for the large quantity of sand handled by this sifter at a small expenditure of power. The machine is substantially built for hard, continuous service without expert attention. Its weight is within the limits of ready portability, allowing the riddling to be done wherever temporary convenience may require.

Fig. 1.—A Pneumatic Sand Sifter Made by the Deane Steam Pump Company, Holyoke, Mass.

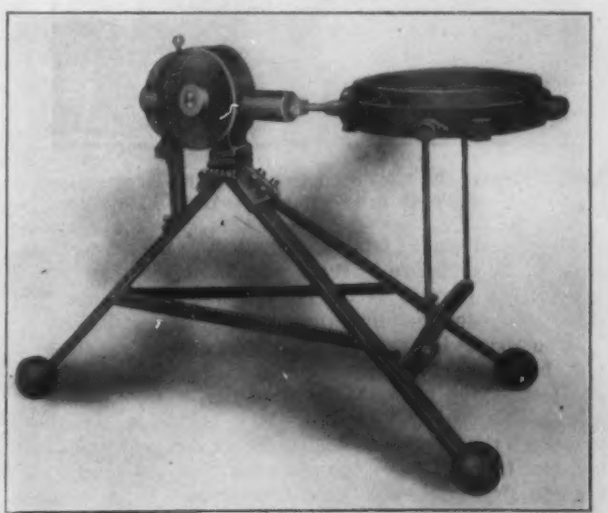


Fig. 2.—The Deane Motor-Driven Sand Riddler.

Sand is excluded from all working parts, preventing wear from the cutting action of the sand. The machine is always ready to start, and requires only the opening of the air valve.

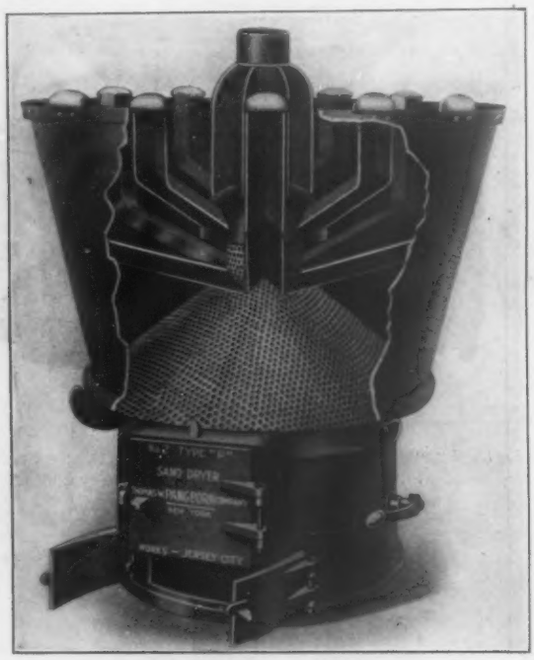
The illustration shows the standard type of machine for the general run of work, such as sifting core and molding sand, and screening the sand used in sand blast, but the company builds various modifications of this design for special purposes, such as screening gangway and scratch room refuse, fixed frames for molding machines, a post attachment for permanent location, &c.

Fig. 2 shows a riddle operated by a small, high speed electric motor of the wholly inclosed type. The machine can be furnished to operate on a crane or lighting circuit of either direct or alternating current.

It will perform in 15 to 20 minutes the work which requires a day for a man to accomplish with a hand riddle.

The Pangborn Ideal Sand Dryer

The purpose in the design of the Ideal sand dryer, made by the Thomas W. Pangborn Company, 90 West street, New York, was to provide inexpensive, efficient apparatus for quickly and economically drying sand



Broken View of the Ideal Sand Dryer Made by the Thomas W. Pangborn Company, New York.

without rendering it friable. Means were needed to take care of the moisture in the sand and at the same time prevent the burning or calcining of the sand, which in many cases destroys its value and usefulness.

The dryer is claimed to be not only the quickest portable dryer for the floor space occupied, and foolproof as to the possibility of burning the sand, but the most economical fuel user as well. The main principle is to keep the wet sand from direct contact with the firebox and to carry away the moisture from the sand during the drying process by air currents. It is accomplished by using a perforated screen, as shown in the illustration, which has the shape of an inverted funnel, the neck of which surrounds the chimney, while the diameter of the conical part, being greater than that of the firebox, makes an air space between the two. This perforated screen supports the damp sand away from the firebox and allows the heated air to pass freely from the firebox and under the sand, carrying away the moisture. The sand as it becomes dry drops through the perforations of the screen and runs rapidly down the inclined surface of the firebox to the floor. As sand will resist the passage of air and heat a number of inverted angle flues project from the firebox through the sand, extending to the top of the hopper into the open air. This allows the hot air to absorb the moisture of the sand in the interior of the hopper and discharge through these flues.

To secure greatest fuel economy advantage is taken of the fact that heat transmitted through an iron wall is obtained in greatest volume from rough surfaces. The inside of the firebox has a number of concentric rings projecting toward the fire, and radial ribs on the outside radiate the heat under the perforated screen. As the sand is supported at all times away from the firebox, coming in contact only with the heated air, it is impossible to burn the sand even with the firebox red hot. Obviously the sand can be dried with greater rapidity by bringing the firebox to a higher heat than is allowed by any other construction. The heat being transmitted to the sand without contact with solid surfaces prevents caking or baking. Small doors in the hopper allow for readily removing material that will not pass through the perforated screen. Either hard or soft coal, coke or wood can be used as fuel, or the dryer can be equipped with oil or gas burners.

In operation the green or wet sand is shoveled into the hopper and requires no further attention. The capacity of the dryer depends entirely upon the moisture and foreign matter in the sand and the degree of heat to which the stove is brought. It is not necessary that the sand be clear before being put into the dryer. While clay will bake and not discharge, earth or any granular material is handled freely by the dryer. The dryer stands 4 ft. from the floor to the top of the hopper and the hopper is 4 ft. in diameter at the top and 37 in. at the bottom. The base is 30 in. in diameter and the hight from the floor to the top of the firebox is 18 in. The weight of the dryer is about 1400 lb.

The dryer is of special utility in foundries for preparing the various sands used that require drying for proper manipulation and to secure the greater abrasive efficiency of sand blast sand. Use can be made of it not only to dry the sand, but to heat the sand blast room in winter.

Other products of the Pangborn Company of interest to foundrymen are blowers, exhausters, core machines, core ovens, core chamfering machines, iron and brass foundry equipment, foundry supplies, sand blast equipment, tumbling barrels, sand mixing machinery, sand sifters and magnetic separators.

The Auto Sand Mixer

A traction sand cutting and mixing machine is a recent development of the Sand Mixing Machine Company, 220 Broadway, New York City, especially adapted for large foundries in which the preparation of molding sand is especially laborious. A prolific cause of the loss of castings and the failure to secure clean, smooth castings is imperfectly tempered sand. Sand properly wet, cut by the Auto sand mixer will be in perfect condition because the knives make a cut every ½ in. from top to bottom of the heap, crushing all lumps and leaving the heap uniform in temper throughout. In appearance and texture it is like a heap of riddled sand. Hand cut sand is always more or less uneven. One Auto sand mixer at a labor cost of from $2 to $2.50 per day for an operator and about 25 cents per day for electric current will cut the sand for about 100 molders. The sand can be cut at night, causing the molders no delay. Because of the thorough aeration and blending of the sand it will often be found possible to mix with the sand regularly used a liberal percentage of lower grade sand and still get an equally good result. The new sand periodically added to the heap can be so thoroughly mixed with the old as to be completely lost in one cutting by the machine.

Fig. 1 shows a front view of the driving side of the mixer and Fig. 2 a rear view of it in operation. The cutting cylinder makes 75 rev. per min. Each blade cuts off a small quantity of sand, throws it up in the air behind the machine, breaking all the lumps and separating the grains. The sand is quickly and thoroughly cooled, all of the steam and gas is blown out, and the sand is

left loose and light from top to bottom. Such sand will shovel easier, riddle faster, ram more uniformly, tuck under bars better and is much less likely to cause blow holes, because it is uniform, both on the surface of the pattern and throughout the mold.

The electric motor operating the machine, both driving it forward and revolving the knives, is usually of 5 to 7½ hp., depending upon the size of the sand heap to

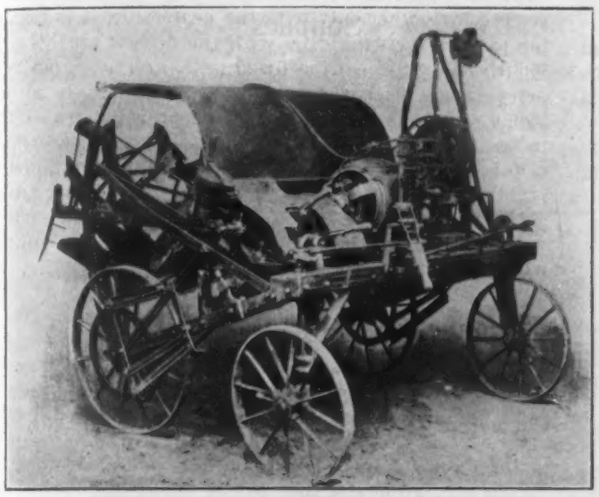


Fig. 1.—The Auto Sand Mixer Built by the Sand Mixing Machine Company, New York.

be cut, and is supplied with current through a flexible cable plugged into a wall socket and carried on an automatic take-up reel, which pays it out and takes it up with no attention from the operator. Clay floors once leveled will remain level because the machine does not dig them up in cutting as the shovel does. The cutting knives are controlled by a multiple disk clutch, which is set so it will slip and prevent breakage in case the knives strike a casting left in the sand.

The machine is designed for cutting sand for all kinds of light and medium side floor molding, stationary or

Fig. 2.—Rear View of the Auto Sand Mixer, Showing the Cutting Blades.

traveling bench molding and for light and medium machine molding. It will leave the sand in the usual long heap for floor molding or will throw it back in a heap by a squeezer or stationary bench. The machines are built only to order, and of types and sizes depending upon the requirements. It is 6½ ft. long, about 7 ft. high, and the width varies from 4 to 6½ ft. between the wheels, according to the work to be done. The extreme width is 12 in. greater than the width between the wheels. The machine will turn in very small space, and will straddle castings or other objects and can be successfully handled in cramped places.

Sellers Centrifugal Sand Mixers

For mixing all kinds of foundry sand, core oil and compounds, William Sellers & Co., Inc., Philadelphia, Pa., build a line of centrifugal sand mixing machines. The illustration shows one of motor driven pattern. All of the machines will disintegrate lumpy sand and will thoroughly and evenly mix all kinds of molding sand, core sand and foundry mixtures economically and quickly.

The machine consists essentially of a rapidly revolving table having on its top surface a number of prongs projecting upward. Sand is fed into the hopper at the top of the machine from which it falls upon a revolving table and is thrown by centrifugal force from prong to prong and out again to the inside of the hood. It emerges from beneath the hood in a fine shower, free from lumps and thoroughly mixed. In mixing core sand containing flour and coal the effect of once passing through the mixer is strikingly apparent. The ingredients are so thoroughly intermingled that the black and white of coal and flour entirely disappear. Core oil or core compound can be thoroughly mixed with sharp sand by passing the mixture twice through the mixer. For

A Self-Contained Motor-Driven Sand Mixer Built by Wm. Sellers & Co., Inc., Philadelphia, Pa.

this purpose and for heavy core mixtures the machine can be run at a slower speed than for green sand. The treatment of mixing strengthens the sand and increases its porosity.

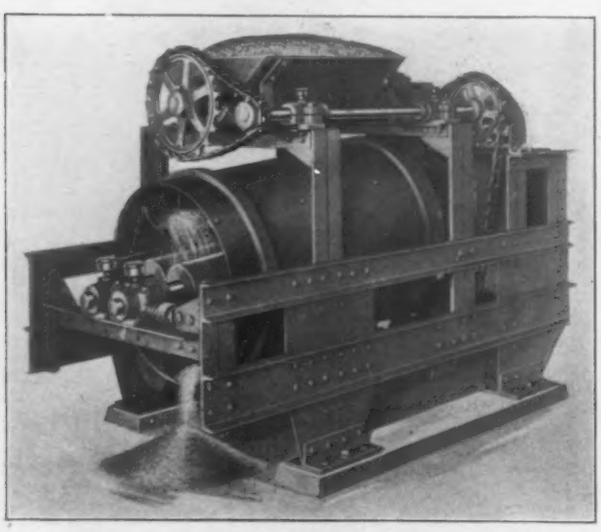
The motor driven type of machine is portable and may be carried about and placed convenient to the sand pile, using a flexible cable to obtain current from the nearest line connection. The machine is driven by a direct current electric motor inclosed within the housing, where it is thoroughly protected from sand and dirt. A controller provides speed variation. In the stationary patterns the machine is built for drive from an underneath pulley or from a pulley on a line shaft or an overhead motor. In the latter form there is a top stand and guide pulley, so that the machine may also be driven from a motor on the floor. The under driven machine has the table spindle, spindle pulley and bearings inclosed in the housing of the base, so as to protect these parts from sand and dirt. A removable door or cover at the front of the housing gives access to the spindle or bearings for cleaning or lubricating. For molding sand the machines are driven at about 1200 rev. per min., and for core mixtures 800 to 900 rev. per min. The machines are built both with sheet steel aprons, as here illustrated, and with cast iron aprons. The hopper can be lifted off for

cleaning the prongs and removing stones, nails, &c., which may not pass between them. Sand that contains such articles should be first screened before being passed through the machine. Roughly the capacity of the machine is about 10 tons per hour, but its actual capacity is limited only by the facility with which the sand can be delivered to and removed from it. As an adjunct to the sand mixing machine the company furnishes when desired a pneumatically vibrated sifter mounted on the hood over the hopper. The sieve so placed and operated at the same time as the mixer makes a combination that does the work of sieving and mixing with but one handling.

The Standard Sand Blending Machine

A new machine for rolling, blending and mixing core, facing, heap and new sands is being introduced by the Standard Sand & Machine Company, Cleveland, Ohio. This machine is built in various sizes and capacities and provides for a repeated rolling of the material with a single set of rolls. The rolls are horizontal, and one has springs to regulate the pressure between them. A variable speed of one roll is provided if desired for a greater crushing and abrasion. The number of times that the same material is passed through the rolls is controlled by the pitch of the drum, which is adjustable to give from 6 to 100 passes. One type of the machine showing the material passing from the drum is herewith illustrated.

The machine has an automatic feeding hopper, from which the material is delivered by a screw conveyor through a spout to the upper end of the drum. The latter revolves on trunnions, entirely independent of the rolls. A series of buckets inside of the drum extend its length and repeatedly return the material to the rolls. The machine can also be equipped with an automatic proportioning hopper, which gives complete control of the quantities of the various materials used.



A Machine for Rolling and Mixing Sand Built by the Standard Sand & Machine Company, Cleveland, Ohio.

Especially is the machine designed for steel foundry work, taking the place of dry pan mills for preparing core and facing sand. It is claimed to be superior to the dry pan mill in that the rolling and blending of material is even and regular, and it does not crush the natural grain of the material. The style or shape of the rolls can be made to meet various requirements. As compared with other means the cost of the first installation is declared to be less and the capacity and efficiency more, the horsepower for operation being from 50 to 75 per cent. less, or not more than 1 hp. per ton per hour.

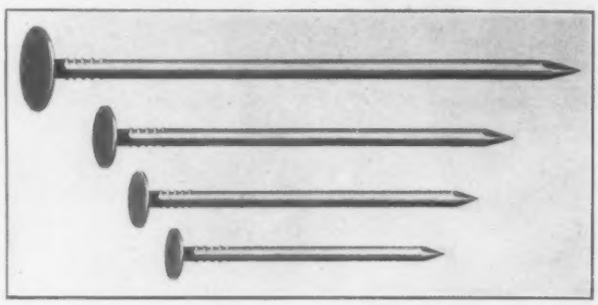
The machine is made in five sizes with 6, 8, 10, 12 and 16 in. rolls, with capacities ranging from 3 to 15 tons per hour. The length of the rolls ranges from 3 to 6 ft. All bearings are phosphorus bronze; all gears cast steel, and the rolls are also cast steel.

The Standard Sand & Machine Company also manufacture a full line of sand mixing, screening and conveying machinery for foundries.

MISCELLANEOUS

Cle-Gal-Co Pattern Shop and Foundry Supplies

Specialties manufactured by the Cleveland Galvanizing Works Company, Cleveland, Ohio, for use in pattern shops and foundries, include die cast white metal pattern letters and figures, brass pattern letters and figures, Fit-Well brass dowels, Fit-Well rapping plates, Hold-



The Large Head, Small Shank Foundry Nails Made by the Cleveland Galvanizing Works Company, Cleveland, Ohio.

Fast pinch dogs, Precision leather fillets, Precision wood fillets, Precision shrinkage rules, Cle-Gal-Co foundry nails and Cle-Gal-Co chaplets.

The points of superiority in the white metal pattern letters are a consequence of the composition of the metal, which is tough and malleable, permitting brads to be driven through the letters and the letters to be bent to fit rounded patterns, yet strong enough to stand considerable use and abuse, and the method of their manufacture by die casting. Particularly due to the latter is the fact that they show no tool and file marks, requiring none for their finishing. The letters are also absolutely uniform in hight and thickness, which is important where they are lined up on a pattern. Correct draft is provided, so that they will draw readily from the sand. The letters are made very accurately as to size, the greatest deviation being scarcely a hundredth of an inch, and their outline is correct, according to the best accepted standards, so that they present a neat appearance. The outlines on the back of the letters are also true and the back surface is perfectly flat. The letters are made in a number of styles, including Roman, sharp face gothic, round face gothic, flat face, thin and slightly thicker gothic, hair line gothic, condensed thin Roman, antique, pointed or fancy, and for branding letters there are made reversed gothic, deep and very deep. In the various sizes of any one style of letters there is a corresponding graduation of thickness.

The company's brass letters cannot be made by the die casting process, due to the higher melting point of the metal, but are carefully made, so that they have the features of uniformity of hight, draft, accuracy to size, graduation of thickness, &c. They match exactly with the white metal letters, so that a damaged letter on a brass pattern can be replaced by filing off the old letter and soldering on a brass one. Red pattern brass is the metal used, which is very tough and easily bent, but not brittle.

Closely akin to the pattern letter business is that of making foundry marks, so that users can place some distinguishing mark on the castings they make for job work and their own use. These are in the form of a monogram, initial, or some special trademark. The company has executed numerous designs for different foundries, the patterns of which it retains and uses exclusively for its customers. Each individual design is the property of the customer and used for no one else. The designs are made from customer's drawings or the

company will submit sketches of designs. Any one design can be made in various sizes to make them applicable to any style pattern and can be furnished in both white metal and brass.

Precision leather fillet is offered as an economical means for filleting patterns, considering the time required. It makes the best job, is not affected by moisture, will not shrink out of place and is easily adjustable to any shape or angle. The Precision fillet is claimed to be cut extremely smooth, slick and true, to be absolutely uniform and made from oak tanned hide and put up in convenient shape for handling. Precision wood fillet is supplied for straight and regular patterns and is less expensive. The back is cut slightly obtuse, so that when it is applied the feather edges adhere tightly to the pattern. It is made from selected white pine, kiln dried, and free from knots and blemishes, and comes in 4-ft. lengths and in bundles of 25.

The illustration shows four sizes of the Cle-Gal-Co foundry nails, from which their distinguishing characteristics are plainly evident—*i. e.*, large heads and light shanks, with no fillet under the head. These nails are made especially for foundry use, being of little value to carpenters, and are offered as a decided improvement on common wire nails. While they cost more, weight for weight, than common nails, it requires only about two-thirds as many for a given piece of work on account of the greater size of the head. They are also easier to insert, being of smaller diameter shank, and for the same reason they are more easily removed from the finished castings, reducing the cost of cleaning and improving the appearance of the castings. Including initial expense, labor of inserting and labor of cleaning castings, it is estimated that the cost of using these nails is less than half that of common wire nails. The nails are carried in stock in 6, 8, 10 and 20 penny sizes.

The most recent addition to the company's lines are its single head forged, single head plate fitted, double head forged, double head plate fitted chaplets and chaplet stems. A higher than usual grade of stock is said to be used and extreme precaution exercised in their production. The metal is low fusing and is tinned with pure tin and not a mixture of half tin and half lead.

The fitted plate chaplets are constructed with an ample shoulder on the under side and are riveted so as to leave the top plate perfectly flush, yet tight enough so that chaplets can be bent to any radius to correspond with the curve of the core. A large quantity of the principal sizes of the standard styles is carried in stock, and special sizes can be made up promptly to order. Tin chaplets are always furnished unless otherwise specified. The single head forged chaplets have heads which are uniform in thickness, perfectly round and perfectly centered over the stem. Chaplet stems can be supplied where the user desires to fit various size plates himself. The single head plate chaplets are always furnished with square plates unless otherwise ordered, as they are preferred in the majority of instances. The company is prepared to furnish chaplets of any size, with plates to fit the diameter of the core, with the stems pointed. Double head chaplets are fitted with either square or round plates, plain or tinned. Square plates are furnished unless otherwise specified. Special size chaplets are made to order.

Diamond Slip-Over Boxes and Bands

A group of steel bands and slip-over boxes, manufactured by the Diamond Clamp & Flask Company, Richmond, Ind., is herewith illustrated. The jackets are made of No. 12 steel, with wood handles, so that they can be handled when hot. The bands are made of ⅛-in. band steel, and small enough to drop into the flask and be rammed up with the mold. Steel bands have the advantages over cast iron bands in that they do not have to be handled carefully in shaking out, and that they can be thrown in a heap and will not break or get out of shape, saving considerable time on the part of the molder. They are made to fit any mold, and are braced if required.

A Group of Slip-Over Boxes and Bands Made by the Diamond Clamp & Flask Company, Richmond, Ind.

The company also makes the Diamond automatic and plunger type core machines, Diamond flask clamps, Diamond wood and metal flasks in a great variety of types, and molders' tools. The latest additions to its lines are snap and plain flasks made of pressed steel. They combine lightness and strength, and it is predicted that they will come into very extensive use.

Sterling Flasks

Flasks, wheelbarrows and carts are the products for foundry use made by the Sterling Wheelbarrow Company, Milwaukee, Wis. Although the company makes an all-

Fig. 1.—The Style E Rolled Steel Snap Flask Made by the Sterling Wheelbarrow Company, Milwaukee, Wis.

steel snap flask, its style E, shown in Fig. 1, it specializes in the manufacture of tight flasks. A round flask is shown in Fig. 2 and is known as style B. The whole line of flasks, including a wide range of sizes and shapes, is new, and the material from which the flasks are made is a special rolled steel section controlled exclusively by the company. The section, as can be seen from the illustrations, is a ribbed channel, and the design has been

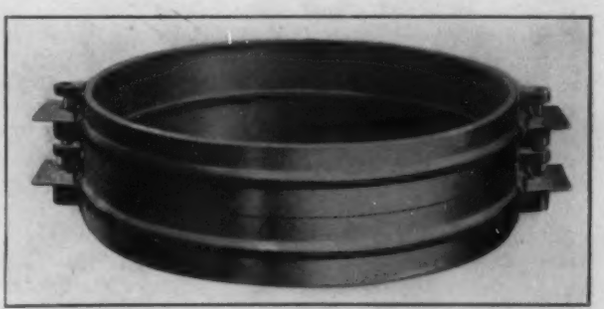


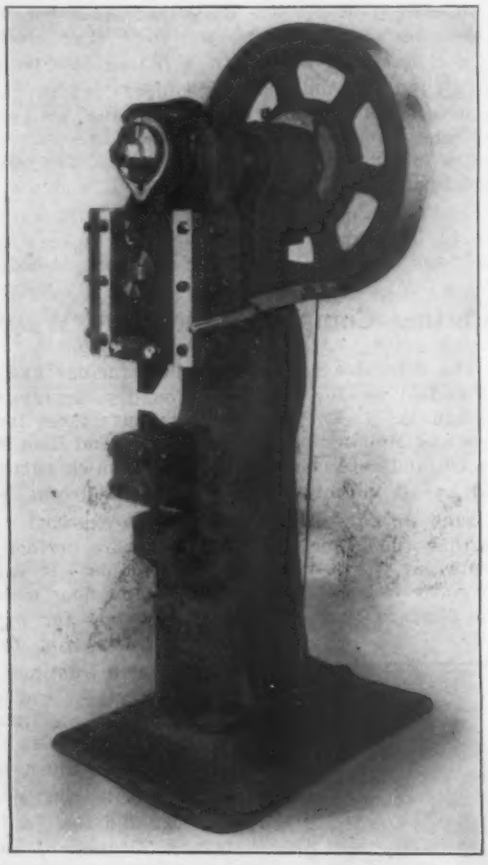
Fig. 2.—The Sterling Style E Rolled Steel Round Flask.

patented. The company feels that it has an especially good material for flasks—better than wood, because it will burn, better than castings because they break, better than sheet steel because it springs. The flask sides are made of a continuous piece bent or curved to shape, with pin holders riveted to place and fitted with pins in such a manner as to enable the foundryman to change his flasks to as many parts as he desires. The pin holders are malleable iron and the pins are cold rolled steel machined, and are removable and interchange-

able. Some of the flasks, as for instance, the style E, Fig. 1, have V-shaped adjustable pins and pin holders, and some are made with reinforced corners, which add greatly to their strength and rigidity.

A Standard Sprue Cutter

A redesigned sprue press, known as the No. 3D, has been brought out by the Standard Machinery Company, Providence, R. I. As shown in the illustration, the machine is furnished with a treadle or hand lever. The cutters start automatically at the highest part of the stroke, so that the operator has both hands free to hold and guide the work. The cutters are made of high grade carbon tool steel, 2 in. square in cross section. This



The No. 3 D Sprue Cutting Press Built by the Standard Machinery Company, Providence, R. I.

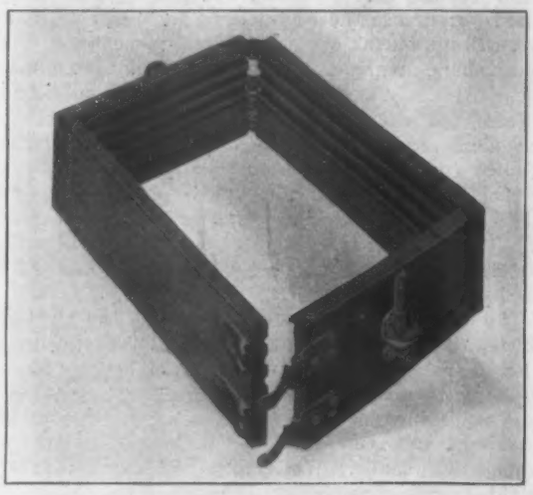
form was adopted because it does away with expensive machine work and fitting. The cutters can be set at right angles to the press if it is found more convenient. The lower cutter has screw adjustment from below and the upper one has a clamping adjustment from above; the knives can therefore be set to cut off without touching each other, thereby saving their cutting edges. The eccentric adjustment on the crank shaft is furnished when desired.

The machine is equipped with an instantaneous roller friction clutch and can be run either continuously or stopped at the end of each stroke. This clutch allows less than 1-32 in. travel of the periphery of the flywheel after it is engaged, insuring a saving of power and friction.

The net weight of the machine is 2500 lb. and of the wheel alone 500 lb. The wheel is 30 in. in diameter and has a face of 4½ in. The overall hight of the machine is 6 ft. The length of stroke is 1¼ in., the distance between the ways 7¾ in., the depth of throat 8 in. and the floor space required 30 x 36 in. The frame is extra heavy and of rigid design and is constructed so as to allow extra working space and convenience for handling work. The overhanging construction of the frame permits large and irregular shaped castings to be handled with comparative ease. The machine is built both plain and back geared.

The New Eureka Snap Flask

A specialty with the Smith & Caffrey Company, Syracuse, N .Y., as successor to C. H. Green & Co., is the new Eureka snap flask. It is made of kiln dried red oak



The New Eureka Snap Flask Made by the Smith & Caffrey Company, Syracuse, N. Y.

with machine lock corners and malleable iron trimmings. The company does not attempt to carry it in stock, inasmuch as requirements of foundrymen vary so in size, but is in position to ship any ordinary order the day following its receipt. The accompanying illustration shows a Eureka flask with the fastenings opened.

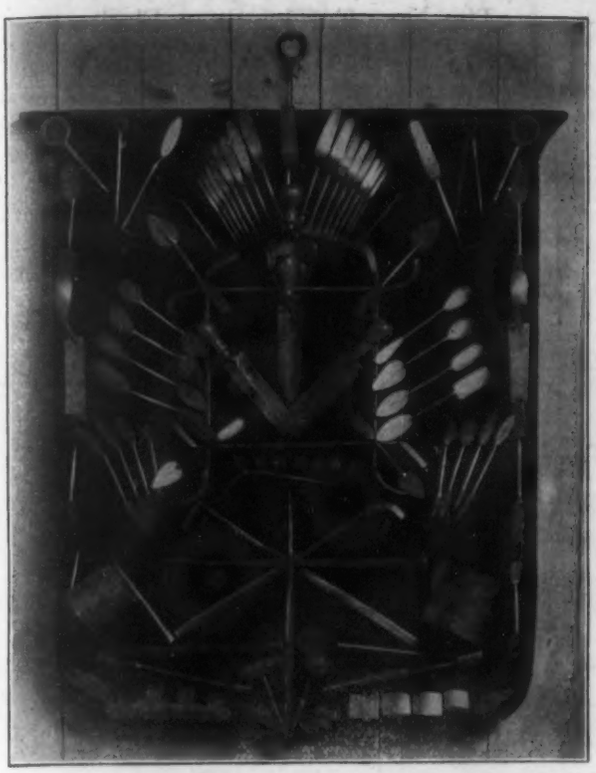
The Paxson Runout Stopper

A new handy foundry appliance is a device for stopping runouts in molds, being placed before the trade by the J. W. Paxson Company, Philadelphia, Pa., and shown in the illustration. It is extremely simple, consisting of a cylindrical cast iron casing, or bell, 4½ in. in diameter and 3 in. deep, with a wrought iron pipe extension, a cast iron disk 4 in. in diameter, fitting in the casing, and

A Device for Stopping Runouts in Molds Introduced by the J. W. Paxson Company, Philadelphia, Pa.

a plunger stem attached to the disk and working through the pipe.

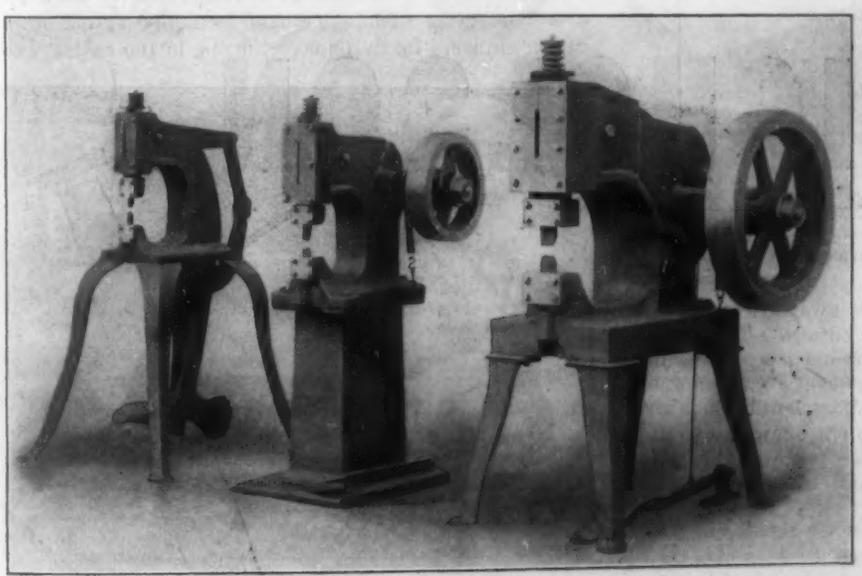
In operation the disk is brought to the rear of the casing, the casing filled with sand and then placed over the runout. Hand pressure on the plunger forces the sand against the flask and thus stops the flow of metal. The device is 22 in. long over all and can be hung on a post or kept any place convenient to the molding floor. Patterns are being made for an additional style with a rectangular casing, so that it may be applied for stopplug runouts which extend for any length along the flask. Special shapes for various purposes are also made to order.



An Exhibit Board of Molders' Tools Made by William Dobson, Canastota, N. Y.

Shuster Sprue Cutters

The sprue cutters built by the F. B. Shuster Company, New Haven, Conn., are of very solid construction, adapted for severe work. All wearing parts are of selected material, and the knives are cast steel, ground to the proper taper. The foot power machine is made in one size only, cutting ½ in. square common yellow brass as its largest size, while the power machine is made in three sizes, the largest size cutting ⅝ x 2 in., or its equivalent. In connection with the foot lever of the smallest machine is a toggle-joint action, making it very powerful and easily operated. In the power machines the knife slide is actuated by a heavy lever driven from a cam on the flywheel shaft. The knife is started by a foot controlled clutch.



Three Sizes of Sprue Cutters Built by the F. B. Shuster Company, New Haven, Conn.

The machines are constructed so that the knives may be shaped according to the sprues to be cut, thus permitting of cutting odd shapes. They make clean cuts, and the castings seldom require grinding. One machine does the work of several men with hammer and chisel, and the labor saving is considerable. The machines are of generous proportions and the throats roomy, so that bulky work may be handled conveniently. In the foot power and smallest power machines the throat depth is 10½ in., and in the two larger power machines 18 in. The knives in the four sizes have widths of 1, 1¼, 1½ and 2¼ in., respectively. The floor spaces are 34 x 39, 25 x 36, 26 x 41 and 32 x 49 in., and the weights, 500, 900, 1300 and 2200 lb., respectively.

Dobson Molders' Tools

The large variety of molders' trowels, lifters, slicks, spoons, &c., manufactured by William Dobson, Canastota, N. Y., is quite fairly represented by the exhibit board, shown at recent foundrymen's conventions, of which an illustration appears herewith. The Dobson tools are fashioned from designs furnished by molders from time to time, for the particular work for which they are adapted, and are forged from steel especially mixed for toughness and wear, hardened and tempered in oil, ground and finished to a proper weight, making them, it is claimed, perfect in shape, hang, temper and finish. The manufacturer specializes in these tools and his entire factory is devoted to this work. The business was established in 1886 in Detroit, Mich., and the tools were then made as the Detroit molders' tools, but since change of location have been given the maker's name. Special tools to customers' designs are made to order.

Parting Compound and Core Wash

In the extensive range of foundry facings and supplies handled by the Keystone Foundry Supply Company, Buffalo, N. Y., products it manufactures include Niagara and Mohawk parting compounds and Lion brand core wash and core compound. The Mohawk parting is offered as an improved substitute for charcoal, rosin, burnt sand, &c., and costs no more than charcoal. It is better than the latter, since it gives more perfect lifts and cuts out the need of patching molds. It can be used equally well on machine, bench and floor molding.

The Niagara parting is a new product for parting molds for brass, iron, bronze and aluminum castings. It is lighter in weight and lighter in color than any parting formerly offered. In its use it is easily seen how much of the material is being dusted over the pattern and the mold and it is also cleaner to handle than other parting compounds. It is claimed that it will neither cut, wash nor burn off the face of the mold. It prevents the sand from sticking to the pattern and produces sharp, clean molds, with every line, shape and conformation delineated precisely as in the pattern. It insures perfect lifts and draws and eliminates the necessity of patching the mold. Another consequence of its use is time and labor saved in the grinding, finishing and polishing departments. On molding machine work it is claimed to increase the production of castings 20 to 30 per cent. Further, it contains nothing injurious to the health, is not inflammable, and leaves no residue in the bag. Its cost is practically the same as that for charcoal, so that it can be used on even common work.

The company is just now introducing its No. 3 combination blacking, which it claims is unsurpassed as a high grade core wash and will compare favorably with any plumbago on the market, and can be used as a bag blacking. The material contains about 75 per cent. graphitic carbon and is not made up of ground coke. It can be rubbed or brushed on a mold and is being used in shops making heavy machinery castings with very good results.

CURRENT METAL PRICES.

The following quotations are for small lots, New York. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:

1 to 1⅞ in. round and square; 1 to 4 in. x ⅜ to 1 in. ..... ₩ lb 1.75¢
1½ to 4 in. x ¼ to 5-1 ..... ₩ lb 1.85¢
Rods—⅜ and 11-16 round and square ..... ₩ lb 1.85¢

Angles:	Cts ₩ lb
3 in. x ¼ in. and larger	2.00¢
3 in. x 3-16 in. and ⅛ in.	2.25¢
1½ to 2½ in. x ⅛ in.	2.10¢
1½ to 2¾ in. x 3-16 in. and thicker	2.00¢
1 to 1¼ in. x 3-16 in.	2.10¢
1 to 1¼ x ⅛ in.	2.20¢
⅞ x ⅛ in.	2.30¢
¾ x ⅛ in.	2.40¢
⅝ x ⅛ in.	3.45¢
½ x 3-32 in.	4.25¢
Tees:	
1 in.	2.65¢
1¼ in.	2.45¢
1½ to 2½ x ¼ in.	2.15¢
1½ to 2½ x 3-16 in.	2.35¢
3 in. and larger	2.05¢
Beams	2.00¢
Channels, 3 in. and larger	2.00¢
Bands—1½ to 6 x 3-16 to No. 8	2.30¢
"Burden's Best" Iron, base price	3.15¢
Burden's "H. B. & S." Iron, base price	2.95¢
Norway Bars	3.60¢

Merchant Steel from Store—

	per lb
Bessemer Machinery	1.90¢
Toe Calk, Tire and Sleigh Shoe	2.50@3.00¢
Best Cast Steel, base price in small lots	7¢

Sheets from Store—

Black	One Pass, C.R Soft Steel.	R. G. Cleaned.
No. 16	₩ lb 2.55¢	2.80¢
Nos. 18 to 20	₩ lb 2.70¢	2.90¢
Nos. 22 and 24	₩ lb 2.75¢	3.00¢
No. 26	₩ lb 2.80¢	3.10¢
No. 28	₩ lb 2.95¢	3.30¢

Russia, Planished, &c.

Genuine Russia, according to assortment ..... ₩ lb 12 @14½
Patent Planished, W. Dewees Wood ..... ₩ lb A, 10¢; B, 9¢ net.

Galvanized.

Nos. 12 and 14 ..... ₩ lb 2.95¢
Nos. 22 to 24 ..... ₩ lb 3.30¢
No. 26 ..... ₩ lb 3.50¢
No. 28 ..... ₩ lb 3.80¢
No. 20 and lighter 36 inches wide, 25¢ higher

Genuine Iron Sheets—

Galvanized.

Nos. 22 and 24 ..... ₩ lb 5.25¢
No. 26 ..... ₩ lb 6.25¢
No. 28 ..... ₩ lb 7.25¢

Corrugated Roofing—

2½ in. corrugated.	Painted	Galvd
No. 24 ₩ 100 sq. ft.	$3.85	4.80
No. 26 ₩ 100 sq. ft.	2.95	4.00
No. 28 ₩ 100 sq. ft.	2.60	3.75

Tin Plates—

American Charcoal Plates (per box.)

"A.A.A." Charcoal:
IC, 14 x 20 ..... $6.35
IX, 14 x 20 ..... 7.60
A. Charcoal:
IC, 14 x 20 ..... $5.40
IX, 14 x 20 ..... 6.50

American Coke Plates—Bessemer—
IC, 14 x 20 ..... 107 lb $4.40
IX, 14 x 20 ..... 5.40

American Terne Plates—
IC, 20 x 28 with an 8 lb. coating $8.50
IX, 20 x 28 with an 8 lb. coating 10.50

Seamless Brass Tubes—

List November 15, 1908. Base price 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908. Base price 18¢

Copper Tubes—

List November 13, 1908. Base price 21¢

Brazed Brass Tubes—

List August 1, 1908. 19½¢ ₩ lb

High Brass Rods—

List August 1, 1908. 14¾¢ ₩ lb

Roll and Sheet Brass—

List August 1, 1908. 14¾¢ ₩ lb

Brass Wire—

List August 1, 1908. 14¾¢ ₩ lb

Copper Wire—

Base Price. Carload lots mill 14¼¢

Copper Sheets—

Sheet Copper Hot Rolled, 16 oz (quantity lots) ₩ lb 18¢
Sheet Copper Cold Rolled, 1¢ ₩ lb advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ ₩ square foot.
Sheet Copper Polished over 20 in. wide, 2¢ ₩ square foot.
Planished Copper, 1¢ ₩ square foot more than Polished.

METALS—

Tin—

Straits Pig ..... ₩ t 40¾@40¾¢

Copper—

Lake Ingot ..... ₩ lb 14¾@15 ¢
Electrolytic ..... ₩ lb 14½@14¾¢
Casting ..... ₩ lb 14¼@14½¢

Spelter—

Western ..... ₩ lb 6 @6¼¢

Zinc.

No 9, base, casks ₩ lb 8 ¢ | Open ..... ₩ lb 8¼¢

Lead.

American Pig ..... ₩ lb 5 @5¼¢
Bar ..... ₩ lb 6¾@6¾¢

Solder.

½ & ½, guaranteed ..... ₩ lb 23½@24 ¢
No. 1 ..... ₩ lb 21½@22 ¢
Refined ..... ₩ lb 19 @19½¢
Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson ..... ₩ lb @10¢
Hallett's ..... @10¢
Other Brands ..... @9¼¢

Bismuth—

Per lb $2.00@$2.25

Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingot for remelting ..... 24¢
Rods & Wire ..... Base Price 31¢
Sheets ..... Base Price 33¢

Old Metals.

Dealers' Purchasing Prices Paid in New York

	Cents
Copper, Heavy cut and crucible ₩ lb	11.00@11.25
Copper, Heavy and Wire ₩ lb	10.75@11.00
Copper, Light and Bottoms ₩ lb	9.75@10.00
Brass, Heavy ₩ lb	7.25@ 7.50
Brass, Light ₩ lb	5.75@ 6.00
Heavy Mechine Composition ₩ lb	9.75@10.00
Clean Brass Turnings ₩ lb	7.25@ 7.50
Composition Turnings ₩ lb	8.25@ 8.50
Lead, Heavy ₩ lb	@ 3.75
Lead, Tea ₩ lb	@ 3.50
Zinc Scrap ₩ lb	@ 4.00